FOUNDRY TRADE JOURNAL

EST. 1902

WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

VOL. 104
No. 2158
Registered at the G.P.O. as a Newspaper

FEBRUARY 20, 1958
Offices: John Adam House, John Adam St., London, W.C.2

Single Copy, 1/-. By Post 1/4. Annual Subscription, Home, 52/-, Abroad 60/- (Prepaid)

OF MICHIGAN
MAR 1 1958
ENGINEERING LIBRARY

ERITH

THE FUTURE
PEACE
TOTAL WAR
WORLD WAR
JUBILEE
CRIMEA
ATERLOO

footprints in the Sands of Time

Erith Loam Marketed in Four Grades—
MILD, MEDIUM, STRONG, EXTRA STRONG and WHITE SILICA for oil cores

Samples on application—

J. PARISH & CO. LOAM QUARRIES, ERITH, KENT
'Phone: ERITH 2056 'Grams: PARISH, ERITH

THE COUNTRY IS TO REMAIN STABLE,
'VE ALL GOT TO WORK LIKE HORSES.
May we supply the Fodder!!
OBSON REFRACTORIES LTD.

JOHN A. SMEETON LTD.
116, Victoria St., London, S.W.1
'Collin' Improved Foundry Ladles—'Perfect' Chilling Spirals
MANUFACTURED IN GREAT BRITAIN

'Shall we convert to Fuel Oil?'

we debated . . . . .

. . . over and over again at our meetings without reaching any result. Then we got hold of a FINA Fuel Oil Calculator—in the form of a slide-rule—giving quick and accurate comparisons between costs of all types and grades of fuel, and we got the answer—Yes!

We saw what the saving by oil would be—apart from less labour and space —and knew the efficiency we'd get as well as being half way to automation! A happy day for our production when we called for the FINA Fuel Oil Technical Advisory Service and of course

FINA FUEL OILS

Write or telephone to:—

PETROFINA (Gt. Britain) LTD.,
INDUSTRIAL FUELS DEPT.,
25, Victoria Street (South Block), London, S.W.1 **Tel: ABBey 7822**
Or any of our Regional Offices throughout the country

FOUNDRY TRADE JOURNAL

Established 1902
Incorporating
IRON & STEEL TRADES JOURNAL
Single copy 1s.; *by post* 1s. 4d.
Annual subscription: home 52s., *abroad* 60s. *(prepaid)*

Editor:
V. C. FAULKNER, F.R.S.A., HON.M.I.B.F.

Assistant Editor: A. R. PARKES, M.I.B.F.
Commercial Editor: P. E. CARDEN.

Advertising Manager:
F. BARRINGTON HOOPER, B.A.

Production Manager:
R. J. LOVELL

Publisher: H. J. DWYER
Circulation Manager: E. T. GRIFFITHS

District Representatives:
G. P. ELLIOTT (Northern Area)
T. H. SMITH (Scotland)

The FOUNDRY TRADE JOURNAL is the official organ of the British Steel Founders' Association; Association of Bronze & Brass Founders; Light Metal Founders Association; Foundry Trades' Equipment & Supplies Association and the National Society of Master Patternmakers.

AN INDUSTRIAL NEWSPAPERS PUBLICATION

Published Every Thursday by Industrial Newspapers, Limited

BARRINGTON HOOPER, C.B.E.,
Chairman and Joint Managing Director

F. BARRINGTON HOOPER, B.A.,
Joint Managing Director and Commercial Director

F. R. LEWIS, *Director*
E. G. WESTON, *Director and Secretary*

JOHN ADAM HOUSE,
17-19, JOHN ADAM STREET,
ADELPHI, LONDON, W.C.2

Telephone: Trafalgar 6171 *(Private Branch Exchange)*
Telegraphic Address: "Zacatecas, Rand, London."

PRINCIPAL CONTENTS

Vol. 104 February 20, 1958 No. 2158

Page

Process Charts applied to Foundry Operations

By F. Gaiger

The Author deals in some detail with the classification, construction and function of process charts. Examples are given of the preparation of the charts themselves and the article concludes with a report of the comments made from among the group of foundrymen to whom the Paper was originally presented 203

Plating of Castings . . . . Developments in the Light of Present-day Knowledge 211

Need for Technical Education

Short extracts from Lord Hives' "Nuffield Lecture" to the Institution of Production Engineers 213

American Technical Papers

Further series of synopses and brief extracts from papers presented at the World Metal Congress in Chicago 217

Application des Plans de Fabrication aux Opérations de Fonderie, par F. Gaiger.
L'Auteur donne des détails sur la classification, la préparation et le rôle des plans de fabrication. Il donne des exemples concernant l'établissement de ces plans, et l'article se termine par un aperçu des commentaires faits par les fondeurs auxquels le mémoire a été presenté pour la première fois. 203

Die Anwendung von Arbeitsvorgangsdiagrammen auf Verrichtungen in der Giesserei. Von F. Gaiger.
Der Verfasser behandelt ausführlich die Einteilung, den Aufbau und die Wirkungsweise von Arbeitsvorgangsdiagrammen. Es werden Beispiele gegeben, wie diese Diagramme zu entwerfen sind und der Artikel schliesst mit einem Bericht über die Bemerkungen, welche von Giessereifachleuten gemacht wurden, vor denen dieser Vortrag ursprünglich gehalten worden war. 203

Electro Déposition sur les Pièces Moulées. . . . Développements Résultant de nos Connaissances Actuelles. 211

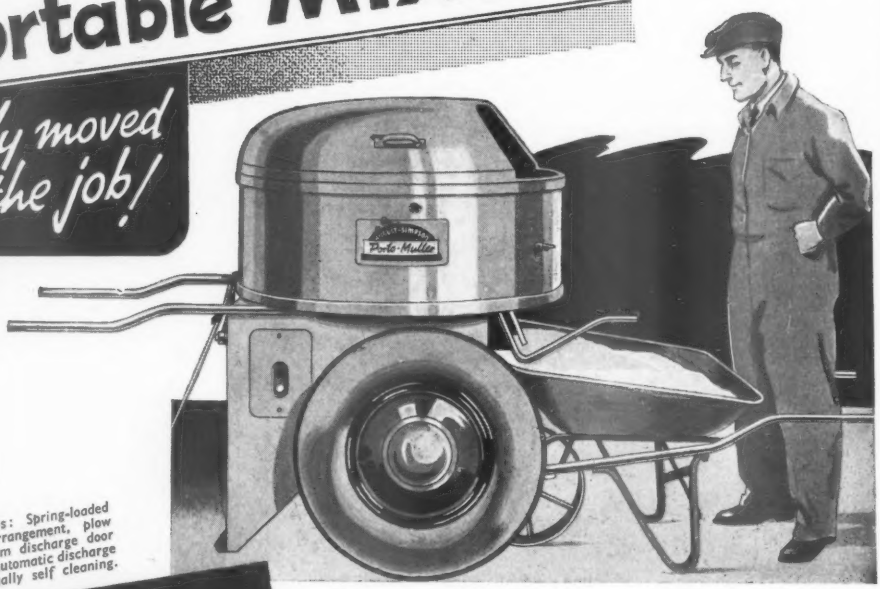
Galvanisieren von Gussstücken . . . die Entwicklung im Lichte gegenwärtiger Kenntnis. 211

Features, News, Commercial Information, and Statistics

Leader: Free for the Asking 201
Hot-dip Galvanizing 202
Borough Polytechnic 202
Air Pollution and Industry 209
Law Cases 210
News from Africa 210
Rhodesian Farmer's Unusual Hobby 212
American Turbine Casting 214
Foundry Coke Trade 216
American Letter 218
Hall of Fame 219
Publications Received 220
Book Review 221
New Catalogues 221
New Patents 222
Contracts Open 222
News in Brief 223
Company News 225
Forthcoming Events 225
Personal 226
Raw Material Markets 227
Current Prices of Iron Steel and Non-Ferrous Metals 228

MODERN Portable MIXER

easily moved to the job!



Inset shows: Spring-loaded muller arrangement, plow and bottom discharge door . . . fast automatic discharge and virtually self cleaning.

A small production unit for mixing loam, sands for the C.O.2 process, oil sands, facing sand, etc. with excellent results.
This portable unit—the smallest production size in our range of spring-loaded mix-mullers, handles approximately 200 lbs. (discharged weight).
Made also with a fixed understructure where portability is not required.

INVALUABLE IN EVERY FOUNDRY LARGE OR SMALL

Inquiries invited; Quotations on request

AUGUST-SIMPSON Porto-Muller

Sole Licensees and Manufacturers for the British Empire (excluding Canada, Australia and New Zealand) of the Simpson Sand Mixer.

AUGUST'S LIMITED
HALIFAX · ENGLAND

Telephone: Halifax 61245/6/7/8 Telegrams: August, Halifax

J.J.M.

FOUNDRY
TRADE JOURNAL

Vol. 104 FEBRUARY 20, 1958 No. 2158

Free for the Asking

"Positive Employment Policies" is the name of a booklet, which is being distributed free of charge to every firm employing 200 people or more, and is available to the smaller concerns on application to their local employment exchange. The booklet has some indirect worth, inasmuch as it is preferable to receive a collection of platitudes, rather than a promise of new legislation. There is a foreword by the Minister of Labour and National Service, Mr. Iain Macleod, in which he makes an appeal to industrial leaders to do their best to make employees feel that they are valued members of the firm and not just a number on a pay-sheet. Such a change cannot be effected overnight or by exhortation, but by a long-term policy. The objective of the booklet is to give publicity to good relations in industry.

The booklet is divided into two parts, the first of which is "How Employment Policy is Applied." It starts off with recommending "planned recruitment"—a policy which has been impossible in the last decade, when full employment has been in vogue. However, there is a suggestion under "security" which is worth consideration, and that is the issue of genuine "contract of service agreements." We think that such a document does create a feeling of an integration of interest between employee and employer. So far as the foundry industry is concerned, we deem that employers and employees are familiar with the rest of the precepts enunciated in this part of the booklet.

The second part, "Examples of Firms' Practice" outlines the efforts made by some 30 firms and nationalized industries in several directions to bring about better working conditions. These are classified under various headings, the first being "The Content of a Company's Employment Policy" and here, internal training to find jobs best suited to the ability of the employee seems to be the keynote, but it is only applicable to large firms, though one firm of only 230 employees undertakes such a duty. The next heading is "Employee Handbooks" and in this context it should be made clear that many foundry concerns already have concentrated on giving to apprentices literature which sets out just what the company provides by way of training and future prospects—a feature covered by the next heading "Training." "Joint Consultation" is next detailed and here personal experience has shown that such efforts are either very successful or a dismal "flop"; certainly they are not popular with the foremen. Under this heading, there is an extract from the works magazine issued by a firm of steelfounders employing 1,900 people. Inadvertently, by selecting this example for propaganda, a disservice has been done to the foundry industry as the very first heading tells of an inquest on a *defective* casting. As a result, the 20,000 or so recipients of this booklet will associate defective workmanship with castings manufacture. Far better to have such returned scrap placed in an illuminated glass case in the middle of the foundry, together with the accompanying letter from the customer. The results from such practice have been alike noteworthy and productive of much good. "Presenting Financial Information to Employees," another heading in the booklet, needs no comment from us, but the final one, "Redundancy and Employee Security" may disclose information of use to management. In conclusion, the booklet is certainly good value for money.

Hot-dip Galvanizing

On February 13, the Hot Dip Galvanizers' Association, an organization started in 1948 which operates within the ægis of the Zinc Development Association, held a Press reception at their headquarters in Berkeley Square, London, to explain details of the productivity sponsorship scheme they have organized. Those present (about 40) were addressed first by Mr. E. M. Wilson, chairman of the "hot-dippers" (as they have been affectionately dubbed), and then by Mr. F. C. Braby, chairman of the Association's productivity committee. Two manuals for general galvanizing, entitled "A Manual of Good Practice" and "A Manual of Costing Practice," have recently been issued by the Association, and further publications in the series are planned. A perusal of these indicates that the galvanizing of sheet-steel fabricated articles in general is covered, without specific reference to castings. It is understood, however, that many jobbing galvanizers amongst the Association's membership of 95 firms do in fact process castings from time to time on a batch production basis. The results in terms of extra life obtained in service from such cast and galvanized items as switchboxes, electrical fittings, manhole covers and frames, ships' cleats and brackets and some food-processing machinery are reported to be very substantial, and expansion of such treatment for castings can be envisaged as a worthwhile objective.

A film "Work Study: Its Application to Teamwork,"* made in conjunction with the British Productivity Council in 1957, was also shown to the assembly. It indicated how special work-study techniques could improve teamwork and complex operations in just the same way as in repetitive and simple operations. The importance was stressed of keeping staff informed and consulting with them so as to gain their co-operation.

Productivity Schemes

Galvanizing is a traditional industry and despite many technical improvements the few, and, in some ways, simple processes involved have not fundamentally changed since inception. In contrast, the industry has made substantial advances in the field of productivity, in plant layout, in materials-handling methods and equipment, and in the more-efficient use of its plant and personnel—all these, largely as a result of extended activities and technical work of the Association and particularly a productivity service it has introduced for members.

This service, started with the assistance of Conditional Aid funds made available until the autumn of 1956, has since been continued with finances provided by the industry. The service is conducted by two qualified engineers, Mr. Northcott and Mr. Hird, who carry out work-study investigations in members' premises, prepare reports on various aspects of productivity, arrange training courses and conferences and provide films and an advisory information service. Most enlightening are the work-study investigations which form the backbone of the service and occupy most of the time of the personnel. Studies have already been carried out in 22 galvanizing works and detailed reports prepared and discussed with the managements concerned. Over 400 recommendations have been made in the reports; they have covered immediate improvements and others which need long-term planning. Some idea of the size of the industry represented by the Association may be gleaned from the fact that 35,000 tons of zinc are used annually for coating purposes.

* The film may be borrowed from the Central Film Library, Central Office of Information, Government Building, Bromyard Avenue, London, W.3.

Borough Polytechnic

Last Thursday at the Borough Polytechnic, Principal Garside presided over a gathering consisting of members of the Governing Board, foundry owners supporting the day release system, and students following courses in foundry practice. The occasion was the inauguration of what is hoped will be an annual function for distribution of prizes awarded to the students in each of the four years. The duty of handing the prizes to the winners was undertaken by Mr. V. C. Faulkner, the chairman of the Foundry Advisory Committee. The following is a list of the successful candidates; the awards being based on classwork, homework and examinations: *Fourth year*: first prize—Mr. R. A. Hailstone, Britannia Iron and Steel Works; second prize, Mr. A. F. Barnes, Creed & Company. *Third year*: first prize—Mr. E. J. Sutton, Enfield Foundry Company, Limited; second prize, Mr. R. J. Orford, J. & E. Hall, Limited. *Second year*: first prize—Mr. D. A. Kemp, Wimbledon Foundry; second prize, Mr. D. J. Vallance, Universal Pattern Company (London), Limited. *First year*: first prize—Mr. P. C. Raisurana (an engineering student); second prize, Mr. C. P. Collins, Morris Singer Company.

Dr. Garside in thanking Mr. Faulkner said that the Polytechnic was deeply indebted to him for the long service he had given the Polytechnic—not only had he presented the prizes, but had inaugurated, and collected the money for them.

Mr. Faulkner, replying took the opportunity of thanking those firms which had by money contributions made the scheme possible. After the ceremony, tea was served and thereafter the visitors inspected the well-equipped foundry and metallurgical departments.

Another UK Exhibit at Cleveland

Following the announcement recently that one UK foundry equipment firm had booked space at the American Foundrymen's Society's exhibition to be held in Cleveland from May 19 to 24 details have been received of another firm's exhibit—that of the British Moulding Machine Company, Limited, of Faversham, Kent. This firm are participating in this bi-annual foundry-equipment exhibition for the fourth time, and on the present occasion will be showing one of their new (BQ 1) automatic moulding machines. This machine will be arranged to produce simulataneously cope and drag halves in pop-off flasks, employing a cycle time of about 10 seconds. Also shown will be a type BT. 1 (turnover) machine making moulds in boxes measuring 22 by 16 by 7 in. deep. In this case, the moulds will be automatically rolled off on "Nomad" motive palettes directly on to "Nomad rails." (This type of conveyor equipment is used extensively in the USA where it is manufactured by the Westover Corporation, the licensees in this country being the Hepburn Conveyor Company, Limited, of Wakefield.) Both moulding machines will be actually making moulds throughout the duration of the exhibition. Of the firm's UK staff, Mr. H. J. Bullock will be leaving for America in the Queen Mary on May 1, and Mr. V. L. Cashmore will follow by air. In addition to Mr. Cashmore and Mr. Bullock and machine operators the stand will be manned by the British Moulding Machine Company's American and Canadian representatives. The two principals will also be visiting many of their firm's plant installations in the United States and Canada and will be journeying by air from as far south as Alabama to the west of the USA and many parts of Canada, including Alberta.

Process Charts Applied To Foundry Operations

By F. Gaiger

The application of work-study principles and methods engineering to foundry operation was the subject of a paper presented last October to the Birmingham branch of the Institute of British Foundrymen by Mr. F. Gaiger, of John Harper and Company, Limited, Willenhall. The practical effect of these methods in the author's own foundry has already been described in the JOURNAL* *and what follows has been abstracted from the earlier part of the paper mentioned above, a section dealing in some detail with the classification and construction of process charts.† The article concludes with a report of the discussion which ensued on the occasion of the author's presentation of his work to members of the Birmingham Branch.*

Definitions

The term "methods engineering" is used to cover work-study, motion study and time study in all its forms. The symbols appearing in Chart 1 are those which have been standardized by the American Society of Mechanical Engineers. There are still in use many others which were originally introduced by Frank Gilbreth, Professor Barnes, and many other exponents of motion study and time study. These symbols are almost self-explanatory in their design, and when combined operations are performed it is possible to draw one symbol within the other.

The predominant descriptions should be fully understood:—The symbol "O" stands for "operation accomplishes some work;" the "arrow" symbol for "transport moves some material;" the "square" symbol for "inspection verifies quantity or quality check;" the symbol "D" for "delay interferes with the process or operation;" the "inverted triangle" symbol for "storage keeps or holds the material or parts and protects them against unauthorized removal."

The items transport, storage and delay are "ineffective" activities in that they do not add any value to the object being manufactured. This reference to transport being "ineffective" is implied in the factory sense, when objects such as castings or raw materials are moved from operation to operation.

Kinds of Process Charts

There are a number of different kinds of process charts defined as follows:—

1. The operation process chart which is used to show the points at which materials are introduced into the process and general sequence of all operations and inspections.

2. The flow process chart for (*a*) the material or (*b*) for the man, showing in full detail the route of the material or the route of the operator. One should clearly mark whether it is a man or material flow process chart that is constructed for a given operation or series of events. Combined man/material flow process charts can also be constructed but need clearly marking for each event within the operation being studied.

3. There is the operator process chart. Usually these are of the two-handed type and analyse details of operator activity at a given work station.

4. There are man- and machine-utilization charts which can be constructed to show the relationship between man time and machine time in a complete work cycle. (See Charts 7 and 8.)

From the brief definition of the classes of charts

Symbol	Activity	Predominant Result	Process Charting Activities
○	Operation	*Accomplishes*	An operation occurs when an object is intentionally changed in any of its physical or chemical characteristics, is assembled with, or disassembled from, another object, or is arranged or prepared for another operation, transportation, inspection, or storage. An operation also occurs when information is given or received, or when planning or calculating takes place.
⇨	Transportation*	*Moves*	A transportation occurs when an object is moved from one place to another, except when such movements are caused by the process or by the operator at the work station during an operation or an inspection.
□	Inspection	*Verifies*	An inspection occurs when an object is examined for identification, verified for quality or quantity, or measured in any of its characteristics.
D	Delay*	*Interferes*	A delay occurs to an object when conditions (except those of processing) do not permit or require immediate performance of the next planned action.
▽	Storage*	*Keeps*	A storage occurs when an object is kept and protected against unauthorized removal.

*The items *transport*, *storage* and *delay* are ineffective activities in that they do not add any *value* to the object manufactured. This consideration of transport as ineffective applies only in the factory sense where castings or raw materials are moved between operations.

CHART 1.—*Process chart symbols standardized by the American Society of Mechanical Engineers.*

*"Fettling and Cleaning Methods and Equipment," by F. Gaiger and R. Hancox, JOURNAL (October 18, 1956), **101**, 437.

† This section and illustrations are reproduced by kind permission of the British Cast Iron Research Association.

Process Charts for Foundry Operations

one can see that a complete survey of all activities in melting shop, foundry, coreshop, shot blast, inspection section, dressing shop and despatch could

Core-making and Ancillary Work. Primary Analysis.

- Unload core sand and binder materials, etc.
- Store core sand and binder materials, etc.
- Transport core sand and binder materials, etc., to mill.
- Mill core sand.
- Transport milled core sand to core-makers.
- Store core-boxes.
- Store core-plates.
- Store wires, rods, nails, brads and grids, etc.
- Transport core-boxes to core-makers.
- Transport core-plates to core-makers
- Transport wires, rods, nails, brads and grids, etc.

Prime Operation No. 1. Core-making.

- Transport cores to drying stove.
- Load to drying stove.
- Dry cores (auto-cycle continuous stove).
- Unload cores from drying stove.
- Transport to inspection (roller conveyor or trolley, etc.)
- Inspect and gauge as necessary.
- Place on stationary racks (or racked trolleys).
- Store on racks until required in foundry.
- Load to core delivery service trolley.
- Transport cores to moulding site.
- Unload at moulding site.
- Hold in moulders' side until required.

Activity	No.
○	9
□	1
⇨	8
▽	5
D	1

CHART 2.—*Typical example of a flow process chart analysing the sequence of operations involved in core-making, based on given factors of operation, inspection, transport, storage and delay.*

be achieved in a short period of time. One can construct a flow chart to show the events in sequence, and with the aid of time-study analysis combined with man-machine-utilization charts and operator-process charts a complete picture of what is happening in any given factory can be drawn up, showing the general utilization of plant and the balance between one section and another in terms of capacity, thus revealing any bottle-necks or "out-of-balance" operations which interrupt the flow sequence, and also the reasons causing them.

Paperwork.

Process charts can also be used to detail the creation and route of every piece of paperwork, where it starts, its staff route and usefulness, to final filing. Charts prepared for office routine to tell the full story of a given organization, it is suggested, would not only show that duplication exists but that quadruplication and quinduplication is a chronic disease in British Industry. Far too much money is paid out to an overstaffed community of indirect workers contributing in no small way to the country's problem of inflation, and reducing its competitive ability in foreign markets.

Summary

The value of process charts is that they are a simple but effective means of recording the sequence of events for any activity, and are a first-class visual aid. Moreover, one can invent one's own symbols always provided they are as self-explanatory as those already devised by the American Society of Mechanical Engineers.

To give other intances where process charts serve a useful purpose, it may be pointed out that there are, no doubt, many foundry managers and foremen alike who have often been faced and taxed with questions regarding the following:—

(*a*) High overheads on certain of their foundry sections caused, most probably, through low machine or plant utilization; (*b*) the indirect labour costs too high in certain sections of the foundry; or (*c*) moulding output per hour considered to be too low and interferences occurring which show up on the wages cards, such as: waiting for facing sand; change-over pattern plates; waiting for moulding boxes; shortage of moulding boxes.

In many instances there are short-term measures which can be taken based on personal judgment and experience, but often such measures are not a permanent solution to the problem. All the facts are needed before a lasting solution to these problems can be found.

Personal Instances

It might be argued, the author commented, that flow charts could be prepared by mental analysis, in other words by recourse to what was taken to be certain knowledge of actual procedure. He gave examples of information set down by himself without leaving the office (Charts 2 and 3) which, he said, might be thought to be comprehensive. A process chart, however, which had been compiled as it should have been—out on the shop floor—would have given information very unlike that listed purely from memory.

The maxim in preparing a process chart was to see the job being done, where it was done, when it was done, who it was done by, what exactly was done, how it was done, always remembering the question—why it was done. Having obtained all the data relative to a given operation or sequence

of events the method was questioned again—was it a necessary operation? and if so was it being done in the right sequence? Could it with advantage be combined with some other operation in the complete sequence of events?

Depending on the actual operation this process of questioning would be applied to the machine, patterns, jigs, fixtures, other tools and handling equipment, etc., used in the operation. Following this secondary analysis recommendations for

Machine Moulding. Batch Production. Jolt-Squeeze Rollover Machine. Cored Job. 2 Machines : 1 machine making bottom. 1 machine making top.

- Store moulding boxes.
- Load moulding boxes on trailer (or stillage).
- Transport moulding boxes to machine side.
- Unload moulding boxes beside machine.
- Store moulding boxes on machine side until required.
- Store pattern-plates.
- Transport pattern-plates to machine side.
- Assemble pattern-plate on machine table.
- Recondition backing sand.
- Transport backing sand to machine side (floor or hopper).
- Unload virgin sand supplies.
- Store virgin sand supplies.
- Transport virgin sand to mill.
- Unload coal dust.
- Store coal dust.
- Transport coal dust to mill.
- Mill facing sand.
- Transport facing sand to machine side (bin or hopper).
- Place moulding box on machine.
- **Prime Operation No. 2. Make Mould.**
- Transport mould from machine (to conveyor or floor).

Activity	No.
○	9
□	-
⇨	7
▽	5
D	-

- Inspect mould.
- **Prime Operation No. 3. Lay Cores and Finish Mould.**
- **Prime Operation No. 4. Close Mould and Clamp.**

CHART 3.—*Flow chart referring to the procedure of machine moulding.*

improving the method would be evolved and improved methods fell into three categories:—(*a*) Improvement in method using existing plant and equipment with no capital expenditure involved. (*b*) Improvement in method using some existing plant and equipment, but involving extra new capital plant as for example when existing moulding machines required to be equipped with some degree of mechanization. (*c*) Entirely new capital plant. In the last case a hypothetical instance could be cited as an example. The directors, it may be envisaged, have issued instructions to their methods department informing them that they are rapidly losing the market for a certain repetitive class of work, and they indicate that works costs have got to be halved in order to hold the business. The methods department are asked to put forward the very best proposals using modern plant and machines. In such cases a comprehensive scheme will be evolved and submitted with capital cost, the details showing a comparison of the costs of manufacture compared with existing methods.

CHART 4.—*Flow process chart of the kind used to study events which intervene between operations.*

Subject	Chart No.	Man / M/C	Material / Process
Department	Date		
Labour or Cost Unit	Annual Production		

Description of Method	Dist. ft.	Time min.	○	□	⇨	▽	D
					•	•	•

in their own works; it would make them realize how much time could be wasted by numerous people on what appeared to be a very simple, straightforward operation.

Two-handed operator process charts (such as that

Old Method.	*New Method.*
① Foreman issues pattern to moulder.	① Foreman instructs labourers' charge hand on boxes required.
1 Moulder measures pattern and decides on type of box.	② Charge hand instructs labourers.
⇨ Moulder goes to box storage area.	③ Labourers procure transport.
2 Moulder searches for and selects box.	⇨ Go to box (with others).
② Moulder marks box.	④ Load to transport.
⇨ Moulder returns to work-place.	⇨ To moulder's work-place.
③ Moulder tells labourers' charge hand he wants box.	⑤ Unload to work-place.
⇨ Labourers' charge hand goes to look at box.	⑥ Clean pins with paraffin.
3 Decides transport medium.	⑦ Moulder applies plumbago.
④ Returns to foundry and instructs labourers.	▽ Waits for job to be started.
⑤ Labourers procure transport.	
⇨ Go to box.	
⑥ Loads box to transport.	
⇨ Transport to moulder's work-place.	
⑦ Unloads at work-place.	
⑧ Moulder checks box pins (rusted).	
⑨ Moulder cleans pins and holes.	
⑩ Applies plumbago.	
▽ Waits for job to be started.	

	○	D	□	⇨	▽	Total	
Foreman	1	–	–	–	–	1	
Moulder	5	–	2	2	–	9	19
Labs. c'hand	1	–	1	2	–	4	
Labourers	3	–	–	2	–	5	

	○	D	□	⇨	▽	Total	
Foreman	1	–	–	–	–	1	
Moulder	1	–	–	–	–	1	
Labs. c'hand	1	–	–	–	–	1	9
Labourers	4	–	–	2	–	6	

CHART 5.—*Flow process chart showing the total number of activities involved in procuring a box part.*

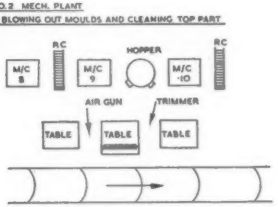
shown in Chart 6) could be prepared by visual observation, but on highly repetitive short-cycle work it might be advisable to use a cine-film and to analyse the activities frame by frame in order to extract the basic elements of motion involved in performing each detailed movement within the work cycle. Such information could also be recorded on a "simo" chart (short for simultaneous motion chart, recording right-hand and left-hand movements). Predetermined motion time systems such as M.T.M. and the work factor system had been developed from the detailed analysis of films.

Another method of film recording was that known as memo-motion, devised and developed by Professor Marvin Mundel. In this system a camera was set up to take a frame per second or some other suitable time-interval, depending on the operation or process being studied. The resultant film could be run through a frame at a time as many times as the engineer required to complete his analysis of all the facts revealed by the film, such facts being recorded in suitable chart form.

The activities of a mechanized plant filmed in such a manner would reveal all relative facts regarding machine and manpower utilization, showing breakdown and other stopping instances. The activities in a general office would show the details of paper work handled, staff, and office machinery utilization data, etc.

A fairly comprehensive set of examples of all types of flow charts with the written word to explain their uses and how they were used in his own plant, had, the author said, been published by the British Cast Iron Research Association.*

CHART 6.—*Two-handed operator process chart indicating the manner in which a recording can be made to show in detail the method whereby a particular job is being performed.*



L.H	Motion Symbol	Time	Time	Motion Symbol	R.H
Reach to top .. 12-in	R			R	Reach to top 12-in.
Grasp handle of top	G			G	Grasp handle of top.
Pull box to table edge 10-in	M			M	Pull box to table edge 10-in.
Hand steadies box	H			R L	Release handle (R.H.)
				R	Reach to trimmer 12-in.
				G	Grasp trimmer.
				M	Move to pound 15-in
				D O	Trim i/s. pound.
				M	Return trimmer 15-in.
				R L	Replace trimmer on hook.
Reach to hose adjacent to air gun .. 16-in	R			R	Reach to air gun 20-in
Move to mould 12-in.	M			M	Move to mould 12-in.
Steady hose and top ..	H			P	Position air gun.
				D O	Blow down peg and pound and top face to remove loose sand.
				PP and M	Move gun and pre-position
				D O	Blow edges, ends and one side, and box pins, to remove loose sand.
Steady mould against body ..	H			PP and M	Move air gun and pre-position
				D O	Blow i/s. mould-face of top to remove loose sand.
Reach to tray over back of bench .. 24-in.	R and C D			R L	Release air gun
Grasp identity disc ..	G				
Move identity disc 24-in. ..	M			H	Steady top part
Place identity disc on top	R L				
Reach to next top	R			R	Reach to next top

DISCUSSION

MR. M. M. HALLETT, M.SC., who proposed the vote of thanks to the Author said that while all were quite convinced about the desirability of applying thought to foundry operations, often the case was that *how* to think was less clear—and the

* BCIRA Journal of Research and Development, 6, 142-160.

purpose of methods engineering, as he saw it, was to lay down a series of rules, for getting one's thoughts in order and seeing how to apply the rules in order to arrive at the desired goal. Very often foundrymen came across all sorts of terms which seemed to them to have some very unusual meanings and Mr. Gaiger's talk had done much to clear the atmosphere regarding methods engineering

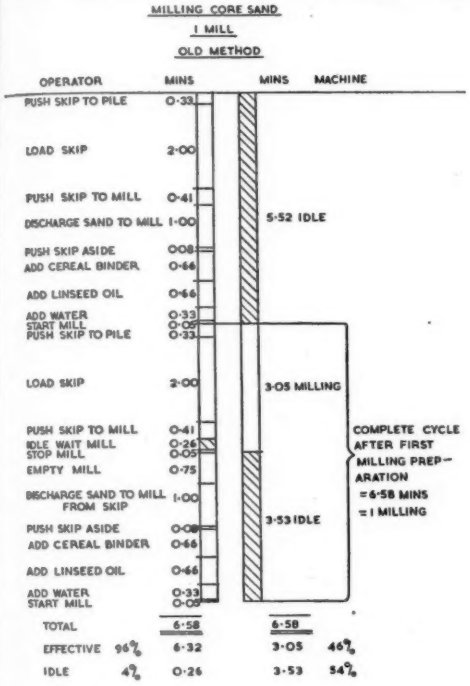


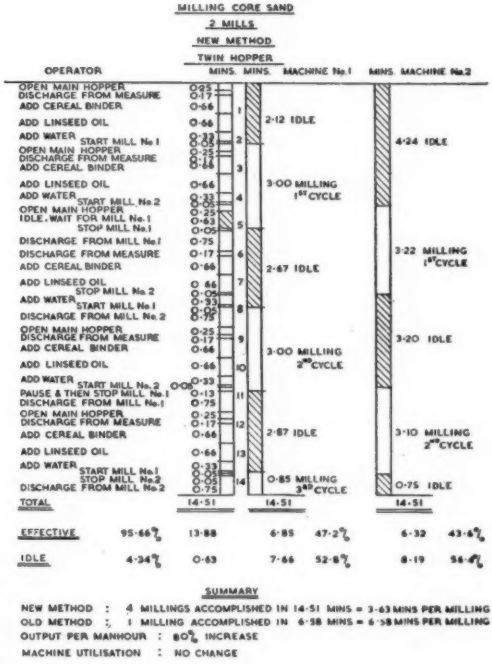
CHART 7.—*Operator and machine process chart giving an analysis of the milling cycle according to the old method.*

terms. He would, he said, suggest to anyone present who had not thought about this subject to take the very simple principles shown by Mr. Gaiger, that he should take some restricted section of his foundry, apply the principles and get the feel of the subject. He was quite certain that, were this done, a proper interest in the subject would be aroused and it would be possible to think and apply the technique in the way it was meant to be applied.

MR. HENDRY, who seconded the vote of thanks, said that he sometimes thought that work-study and methods engineering, like many other subjects had a tendency to become clouded in mystery. Many papers on the subject had been presented and he had wondered how useful and desirable the material was, how these techniques could be applied in his case. Mr. Gaiger had certainly clarified any mysteries. Mr. F. W. Taylor, one of the early pioneers of time study in the United States, and one of the most outstanding men in his field, believed that methods improvement could only be achieved by associating complete trust between all concerned. The fundamentals of the system had not changed since, and, certainly, the human problems he was aware of then still existed. Mr. Gaiger too was aware of them, and what was more important had carried out his work in order to contribute to the ability to work properly.

MR. H. G. HALL, F.I.M., said that he had been most interested to see the arrangement for feeding work to and from the grinders. He had heard the view expressed that if one fed the grinder to such an extent that grinding was absolutely continuous, then the fatigue from such an operation became

CHART 8.—*Operator and machine process chart showing economies in time and labour effected by introducing a new method for the milling cycle referred to in Chart VII.*


MILLING CORE SAND
2 MILLS
NEW METHOD
TWIN HOPPER
OPERATOR
MINS.
MINS.
MACHINE No.1
MINS.
MACHINE No.2
OPEN MAIN HOPPER 0·08
DISCHARGE FROM MEASURE 0·17
ADD CEREAL BINDER 0·66
ADD LINSEED OIL 0·66
2·12 IDLE
ADD WATER START MILL No.1 0·33
OPEN MAIN HOPPER 0·25
DISCHARGE FROM MEASURE 0·17
ADD CEREAL BINDER 0·66
4·24 IDLE
ADD LINSEED OIL 0·66
3·00 MILLING 1ST CYCLE
ADD WATER START MILL No.2 0·33
OPEN MAIN HOPPER 0·25
IDLE. WAIT FOR MILL No.1 STOP MILL No.1 0·43
0·05
DISCHARGE FROM MILL No.1 0·75
DISCHARGE FROM MEASURE 0·17
ADD CEREAL BINDER 0·66
2·67 IDLE
3·22 MILLING 1ST CYCLE
ADD LINSEED OIL 0·66
STOP MILL No.2 0·05
ADD WATER START MILL No.1 0·33
DISCHARGE FROM MILL No.2 0·75
OPEN MAIN HOPPER 0·25
DISCHARGE FROM MEASURE 0·17
ADD CEREAL BINDER 0·66
3·00 MILLING 2ND CYCLE
3·20 IDLE
ADD LINSEED OIL 0·66
ADD WATER START MILL No.2 0·33
PAUSE & THEN STOP MILL No.1 0·13
DISCHARGE FROM MILL No.1 0·75
OPEN MAIN HOPPER 0·25
DISCHARGE FROM MEASURE 0·17
ADD CEREAL BINDER 0·66
2·87 IDLE
3·10 MILLING 2ND CYCLE
ADD LINSEED OIL 0·66
ADD WATER START MILL No.1 0·33
STOP MILL No.2 0·05
DISCHARGE FROM MILL No.2 0·75
0·85 MILLING 3RD CYCLE
0·75 IDLE
TOTAL 14·51 14·51 14·51
EFFECTIVE 95·66% 13·88 6·85 47·2% 6·32 43·6%
IDLE 4·34% 0·63 7·66 52·8% 8·19 56·4%
SUMMARY
NEW METHOD : 4 MILLINGS ACCOMPLISHED IN 14·51 MINS = 3·63 MINS PER MILLING
OLD METHOD : 1 MILLING ACCOMPLISHED IN 6·58 MINS = 6·58 MINS PER MILLING
OUTPUT PER MANHOUR : 80% INCREASE
MACHINE UTILISATION : NO CHANGE

extensive. Would Mr. Gaiger agree that if a man were to pick castings up from a stillage and place them aside in a finished-work stillage then this, to some degree, broke up the operation of grinding, and that the intervening period for pick-up and disposal would offset the fatigue?

THE AUTHOR pointed out that the present shop had been laid out in 1930 and capital expenditure had been obtained for improvement only. The idea of moving the grinders through an angle of 90 deg. to save the operation of pulling pans of work across the feed line conveyor to aside the grinding machine had in fact been considered, but

this would have created many other problems in the layout involving further capital expenditure which would have been difficult to justify. The increase in the wheel speed had certainly helped to offset operator fatigue in that a much better cutting action had been obtained and also longer life from the grinder wheels. Wheel chatter was reduced to the minimum and in general 15 to 20 per cent. fatigue allowance had been made. In terms of the time values issued for the jobs in the fettling shop, relative to earnings attained, this allowance seemed quite adequate. Experts in the field of muscular reaction might not agree with the observation, but there was no evidence of grinding operators suffering any more from muscular complaints than any other operators.

Waiting-time Bonus

MR. G. BOYD (Coventry) asked if the operator was paid a bonus when waiting, and if so at what rate.

MR. GAIGER replied by saying that waiting time beyond the operator's control was paid for at the operator's rate. With regard to bonus, a time value was built up from all the elements involved in performing the operation. A piece-work value was issued in accordance with the standard time, and depending on the operator's performance he might earn time and one third or time and a half, or even double time. This depended on the individual operator and the effort he expended throughout the working day. All the piece-work supplements and cost of living bonus had been divorced from the basic rate, and such items were added to piece-work earnings on a percentage basis.

MR. BOYD asked if micro motion was used at all.

MR. GAIGER said that Mr. Tonks when he was with BCIRA had made some films of moulding operations in No. 2 Mechanized Plant, and a number of films of further films had been made since from which micro motion analysis charts had been extracted. Pre-determined motion time systems such as MTM could usefully be employed in grinding operations, and should be borne in mind that it was the positioning of a work-piece to the grinding wheel to carry out the grinding operation on all faces of the work-piece involved that did, in fact, create an extensive amount of body member movements and so many problems in building up synthetic time values for such work.

Pre-determined motion-time values more often than not indicated that conventional time-study values were too high, and it had been proved by Mr. Desmond, the statistician, of the University of Birmingham that time-study engineers in this country tended to rate flat. In other words when an operator was working very slowly they would not rate him low enough, and when an operator was expending a terrific effort they would not rate him high enough. If pre-determined motion time values were to be used then the method had to be first class. He would not suggest that all of the methods in the fettling shop were first rate, and in any case there was always a better method, otherwise there would be no progress. To a further question from MR. BOYD asking if he rated below 60, MR. GAIGER replied in the affirmative.

Watering Sand

MR. J. W. DEAKIN said that while he did not know much about time and motion study, he thought that there should be some mechanical aid in the foundry for watering sand. It had struck him, he said, that here was something which might be studied with great advantage.

MR. GAIGER said that hoses had been used for this but with disastrous results, since the sand was not in a fit condition to use the next day. A bucket was certainly the best means of measuring the amount of water to be put on bulk sand. He remembered one particular night when there had been trouble from a number of the night shift workers. About fifteen of them had been sacked and the foreman rightly asked who was going to do the job. Three time-study engineers, three foremen and a number of men off the day shift had been brought in. He had become quite " fed up " with soaking sand with buckets of water and had decided to use a hose pipe with the disastrous results already mentioned.

Asked if he had any kind of numbering system for stillages, Mr. Gaiger said that during the Easter recess all the stillages had been numbered and a location ticket containing details of customer, pattern number, quantity weight, stillage number and any relative data, regarding visiting inspection such as A.I.D. had been introduced. The location ticket would pass to the despatch office to be filed in alfa/numeral order and as loads for delivery were built up the advice notes were made up from the location tickets. The tickets being removed from the " live " work file when the work had been despatched, so that at any time the despatch deck was aware of all the stock they held awaiting shipment. This moving stock control system had worked very well.

MR. A. PEARSON said that he had often looked at time and motion study and had wondered if this analysis data was really necessary to fix piece-work standards and improve methods. Could not the results which the author had described have been accomplished without such investigation? Furthermore could the dressing shop *not* have been combined earlier than 1953?

MR. GAIGER said that he did not think the results could have been accomplished without intensive investigation. How could an increased output per man hour of 100 per cent. be achieved? How could the need of complete re-staffing to balance operation with operation in the flow sequence, have been seen without knowing the time factor? Time was the biggest part of the cost in any job, and to see how the cost of man time (including staff time), added the greater part of the total value to the product than any other item then was to realize the need to investigate how, when, where and why that amount of time was necessary to perform a series of operations on a work piece or assembly.

If there was a better and quicker way of doing

the job than using the known methods of time study, motion study, or predetermined motion time systems, then he for one would be a ready, willing and keen listener.

It was known that the Russians had reorganized many of their large industries on the lines of F. W. Tayor's principles of scientific management, and in conjunction with the intensive technical education programme originally introduced in 1925 they had achieved a state of fantastic industrial expansion in thirty years. They were by no means behind in the field of automation; in fact one factory in the industrious Urals is reputed to make 95 per cent. of the pistons used in internal combustion engines in the USSR, and this automechanical factory employed only nine direct operatives.

MR. T. H. WEAVER commented that he had not heard any mention of the effect the estimation had on the standard of pattern equipment. Was there any method of assessing this. He felt that it was of initial importance when initiating planning and method study to get the right kind of pattern equipment.

MR. GAIGER said that he agreed wholeheartedly. Pattern layout began in the estimating stage, and depending on the quantity of castings required off a given part. His own works might have multiple metal patterns mounted for machine-moulding production, or alternatively a wood pattern for a one-off in the floor-moulding section. In the main gunmetal patterns were used for repetitive machine moulding, because they could be fairly easily altered if the customer asked for modifications, and what is more they worked up to a wonderful "sheen" resulting in good clean lifts from the mould. Furthermore, there was the planning of gating systems to be considered and Mr. L. Clarke had mentioned this in a paper which he had presented recently. He entirely agreed with Mr. Weaver that the finished casting was closely associated with the quality of the pattern equipment.

He concluded by saying that if anyone had any second thoughts about the questions and answers, or indeed any of the lecture, he would be only too pleased to answer in writing any questions not involving company economics.

Air Pollution and Industry

Whilst acknowledging that the main responsibility for applying the Clean Air Act, 1956, for the purpose of reducing air pollution rests with local authorities, the Minister of Housing and Local Government has allowed a strictly limited extension of the Alkali Act to admit certain industrial processes. These present special technical difficulties in regard to the prevention of pollution by smoke, grit, and dust, and require the attention of a single inspectorate with special technical qualifications.

Having considered the cases of the industries represented at the public inquiry carried out by Sir Frederick Armer last June, the Minister has scheduled the following works under the control of the Alkali Act:— Ironworks, steelworks, copper works, aluminium works, power-stations, ceramic works, gas and coke works, producer-gas works, sulphate-reduction works, caustic-soda works, and chemical incineration works.

He has also decided to add to the list of noxious and offensive gases in Section 27 of the Alkali Act the following:—Fumes containing aluminium or its compounds; fumes containing chlorine or its compounds; fumes containing iron or its compounds; acetylene; compounds of ammonia.

The Clean Air Act, 1956 (Appointed Day) Order, 1958 (SI 167), came into operation on February 7, the purport being that smoke emitted from any chimney or funnel after June 1, must not be as dark as, or darker than, Shade 2 on the Ringelmann Chart, or it may cost the emittor up to £100 in fines. The ban will apply equally to factories, shops, offices, and houses, and the funnels of ships and railway engines. In the event of proceedings, there may be the defence that dark smoke was due to lighting up a furnace from cold or to mechanical failure. Grit and dust emission comes under the Act on June 1, after which new furnaces installed for burning pulverized fuel or more than 1 ton an hour of other solid fuels will have to be equipped with grit- and dust-arresting plant approved by the local authority except where scheduled under the Alkali Act (see earlier). Failure to take practical steps to minimize grit and dust from new and existing furnaces will also be an offence.

In connection with this matter, a circular 6/58 has been issued to local authorities and other sanitary authorities and County Councils in England and Wales giving guidance as to the application of the Act to smoke and fume from new ovens and furnaces. Appendix I of this circular, carries the remark that the variety of types of industrial furnaces, *i.e.* furnaces other than the furnaces of boilers, is very wide and their design is a specialized subject. Individual applications will therefore be considered by local authorities on their merits and in relation to the fuel which is intended to be used, the equipment provided and the purpose for which the furnace is to be employed.

[It is understood that the status under the Act of various types of foundry furnaces is still being considered and a report will be printed in this JOURNAL as soon as matters are clarified.]

Ferro-alloy Trading

If founders and steelmakers have their worries—the threat of re-nationalization and increasing evidence of competition in the export markets are two of them—so apparently have their suppliers. Producers and distributors of ferro-alloys are much concerned about competition from behind the Iron Curtain. Supplies of, for example, ferro-silicon and ferro-chrome are being offered in this country and on the Continent at prices which, they say, they cannot possibly match. So far, it is understood, Russia and her satellite countries supplying ferro-alloys have captured no more than 10 per cent. of the trade, but it is thought that they may succeed in getting 25 per cent., which would constitute a serious challenge to traditional suppliers. These suppliers claim that competition from behind the Iron Curtain has a wider significance than is immediately apparent and is something outside the cut-and-thrust of ordinary business dealings. It is alleged that it is not just a question of lower prices for particular transactions, but that Russian suppliers have intimated that they are prepared to go below any price which may be quoted by others however low that may be. Thus it might be a matter of political strategy rather than trading activity on the part of Russia.

Law Cases

Plaintiff Two-thirds to Blame

Judge Norman Carr, at Stourbridge County Court, found a plaintiff two thirds responsible for an accident which had led to his action before the court. The plaintiff was Mr. Oliver Morgan Westwood, and he sued the British Thomson-Houston Company, Limited, for £400 damages, alleging negligence on the part of the firm at its Blackheath (Staffs) works.

For the plaintiff, Mr. Ian J. Black said that Mr. Westwood was employed as a crane slinger in one of the stores in which were stacked electric-motor frames of various sizes. On September 21, 1956, Mr. Westwood was looking for some frames in a very congested part of the stores. He climbed over a lower stack, some of the frames slipped, and he fell, breaking his leg. The company contended that Mr. Westwood had been forbidden to climb over the stack because it was dangerous and that he should have used the equipment provided.

Mr. Westwood described how the accident happened, and in reply to Mr. A. W. M. Davies (for the company) he said he was aware that it was dangerous to step on to the frames. He agreed that he was impatient on that occasion, and added:—"I took the risk." When he started to climb the stack the crane was in another part of the building. He denied that the foreman warned him not to climb on the stack, but agreed that a workman did. "I must admit now that it was a risky thing to do. I risked it many times," he added. Although the risk was obvious, he never complained to the management.

Mr. Thomas Ralph, who is in charge of the stores, gave evidence that he had issued warnings on several occasions against the practice of climbing over the stacks, and when Westwood first started to work there he received the same warning. Certain equipment was used for the removal of the frames, and there was nothing to prevent Westwood from making use of it.

Mr. Davies said an employer could expect an employee to behave in a sensible and co-operative manner, and he claimed that Mr. Westwood had been negligent. At no time had Mr. Westwood or any of the employees approached the management complaining of the existence of danger.

Mr. Black, however, maintained that the firm must carry the major proportion of the blame.

Giving judgment, Judge Norman Carr held that the firm did not completely carry out its duty of stacking the frames in a proper and safe manner. Men should not be subjected to the temptation to climb over stacks in order to do their work. He did not regard it as a very serious act of negligence, but he found it was negligent, and also that there was a breach of statutory duty. On the other hand, Mr. Westwood knew all about the danger, and the majority of the blame must fall fairly and squarely on his shoulders. He therefore judged that two thirds of the responsibility must go to Westwood and one third to the firm.

Special damages had been agreed at £193 10s., and he would make that up to £250. There would be judgment for the plaintiff for £83 6s. 8d. with costs.

Widow Awarded £2,300

A jury sitting with Lord Migdale have awarded £2,300 damages in the Court of Session to Mrs. Margaret Lindsay, whose husband, Thomas Lindsay, was fatally injured when he was struck by a batch of six baths on January 27, 1955, while employed by Saunders & Connor (Barrhead) Limited.

Mrs. Lindsay, who sued the company for £4,000, said that her husband was engaged in the packing and despatching of baths, which were being lifted by a crane, when a sling slipped and the load fell on him. She blamed the defenders for failing to provide a sling which would securely hold the load. The defenders maintained that the accident resulted from misadventure for which they were not responsible.

News from Africa

RISCO Development.—Contracts worth £4,000,000 have been placed by the Rhodesian Iron and Steel Company (Pvt.), Limited, during recent months as the first part of the £8,000,000 development plan. The company is also in the process of taking decisions on contracts for a further £1,500,000. Tenders for these contracts were received from all parts of the world, but most of them came from Britain and the Continent. The successful tenderer for the coal-handling, coke-oven and by-product plant was Powell Duffryn Coppee, Limited; the value of this contract is estimated at £1,250,000. The contract for blast-furnace and gas-cleaning equipment, also worth £1,250,000, went to Head Wrightson, Limited, and the sinter plant contract for treating fine iron-ore, worth £500,000, went to Simon Carves, Limited. An order for turbo-blowers, valued at £110,000, has been given to a Swiss firm, Brown & Boveri, and a Salisbury firm, Lysaght & Company (Pvt.), Limited, has been successful in securing the contract estimated at £250,000, for building extensions to the open-hearth plant, including steel work for the new furnace. Mr. P. E. Holloway, a director of RISCO and the Lancashire Steel Corporation, Limited, said that the contracts should be finished by early 1960, when estimated production would be 150,000 tons of crude steel and 160,000 tons of pig-iron per year. He added that the major part of the development programme would be at Redcliff, nine miles from Que Que; modernization of the Bulawayo work would come later. Because of the high degree of mechanization, the increase in staff will amount only to about 100 Europeans, bringing the total number of employees up to 450 Europeans and 1,700 Africans. Ancillary industries, however, attracted by the Iron and Steel Works, should help to bring prosperity to Que Que and provide considerable employment. One of these industries, Lancashire Steel (Rhodesia) (Pvt.), Limited, hopes to start production in February next.

Nickel Discovery.—Reports of new deposits of nickel have come from the Bindura area; and the new strike, not far from the original "mountain of nickel," is believed to have a lode three miles long varying in width between 150 and 650 ft. Strike tests proved economical nickel values, with low values of copper and cobalt. This deposit appears to be similar to the nickel deposits now being brought into production in Manitoba.

Railways Order.—To help to meet the demand for transport for mineral traffic, especially coal, the Rhodesian Railways have ordered 1,000 bogie trucks, each capable of carrying nearly a 50-ton load. The bogies are being made in South Africa and in England.

Chrome Export.—Southern Rhodesia is aiming at an export figure of 1,000,000 tons of chrome-ore per year, and the Secretary for Mines, Mr. C. L. Honey, is reported to have said that this would probably make Southern Rhodesia the foremost chrome supplier in the Western World. He added that the transport position had eased and that an adequate number of trucks were now available for the transport of the whole of Southern Rhodesia's chrome production for export.

Plating of Castings

Developments in the Light of Present-day Knowledge

Several references to the plating of castings are contained in a paper entitled "Some Aspects of Zinc, Copper, Nickel and Chromium Plating" presented by Mr. L. Ades (of Société Continentale Parker, France) to a distributors' conference organized by the Electro-Chemical Engineering Company, Limited. The sections which have major interest for readers of this JOURNAL are reproduced in what follows:—

Zinc Plating of Cast Iron

A great variety of operations are necessary for the preparation of the surface of cast iron especially when it is necessary to produce on these alloys a deposit from solutions with low hydrogen overvoltage, as is the case for the zinc bath. It is in fact necessary to eliminate oils, greases or polishing compounds which remain on the metal. Again, one must get rid of oxide films as well as inclusions of graphite and foundry sand. Several methods of treatment have been published by various authors, including the American Society for Testing Materials; all these have been tried (by the Author) and have not given the results expected.

The process which the Author has perfected for the zinc plating of cast iron and which can be used in an automatic line, is briefly described here. This process is valid for any type of cast iron, *i.e.* white cast iron, grey, nodular or spheroidal-graphite cast iron and malleable cast iron.

Alkaline pre-cleaning, or emulsions, gave very bad results because of the retention of alkaline or other products in the pores of the metal. Degreasing is therefore effected with chlorinated solvents. This operation is immediately followed by alkaline degreasing. Degreasing is done anodically, in order to avoid hydrogen embrittlement. The current density should be higher than 7 amp. per sq. dm.; the temperature should be higher than 90 deg. C. and the maximum time from two to three minutes.

When degreasing is carried out over too long a time, the same defects are noticed as when carrying out alkaline pre-degreasing. The alkaline degreasing operation is followed by hot (75 deg. C.) then cold rinsing, by dipping or preferably with a spray. This abrupt variation in temperature seems to suit perfectly steels of high carbon-content. It seems that this abrupt variation favours the elimination of matter retained in the pores and which might not have been eliminated after the two degreasing operations.

Pickling

The next operation is one of chemical pickling. It is certain that the pickling operation is the most critical in all ranges of the preparation of cast iron. The greatest difficulties are apparently due to free graphite carbon which appears in the form of nodules or flakes and which is precipitated on to the surface of the parts. Hydrochloric pickling baths were first tried at concentrations varying between 2 and 100 per cent., in addition to sulphuric pickling baths at several concentrations, and phosphoric and phosphoric-sulphuric pickling baths, etc. It was found from these different tests that the process cannot be guaranteed whatever may be the acid used or its concentration.

Anodic etching in a sulphuric medium did not give the expected results either, whether carried out in a diluted or concentrated acid bath. The only bath capable of giving correct results was the sulphuric-hydrofluoric bath in which the respective concentrations of sulphuric acid and hydrofluoric acid were critical. With this bath it was possible to treat, both in the Author's works and those of customers, a very large quantity of parts. This operation was followed by cold rinsing and activation in a solution of 25 gm. per litre sodium cyanide, without the use of current.

After cold rinsing, a cadmium "flash" was carried out at 2 amp. per sq. dm. lasting two to three minutes, followed by cold rinsing and zinc plating.

This method of preparation avoids not only stoving at 200 deg. C. for several hours both before electrolytic treatment and after, but also the operations requiring a special installation such as that for the anodic method, the sulphuric treatment or electrolytic polishing for example. Automatic installations can be used for zinc plating cast iron using this technique.

Alkaline Copper-plating Baths

The scarcity of nickel on the one hand and the poor quality of cast or die-cast white alloys on the other led the Author to a large series of investigations on alkaline copper-plating baths, with a view to obtaining thick deposits capable of being easily brightened or deposits bright in themselves.

The first part of the investigation was to find the best basic formula for the copper-plating bath, and the results were presented in a previous report. The curves representing the variations in the cathodic efficiencies in relation to the different factors constituting the bath and conditions of use are sufficient to give information upon the composition to choose. This part of the study also made it possible to perfect a simple method of measuring the cathodic efficiencies which were also described in the paper.

In the second part of the investigation, an attempt was made to obtain a bright deposit starting from a given basic formula. This was not a question of obtaining a very bright deposit, but of producing one capable of giving a high thickness so as not to upset the brightness of the Udylite nickel bath. Physical tests which were carried out included periodic inversion and periodic interruption of the current. In both the latter cases the deposit was improved without, however, making it bright, and the great advantage of these two processes consists

Plating of Castings

in a better distribution of the deposit, which is extremely useful when it is a question of nickel plating complicated die-castings.

The chemical tests carried out were connected with a search for one or more processes capable of giving a sufficiently bright deposit without periodic interruption. A large number of both mineral and organic compounds were tried and it was possible to formulate several general rules.

Practically all mineral or organic compounds of sulphur allow deposits ranging from a semi-bright satin finish to full brightness to be obtained. Their disadvantage, however, is to give rise, in the medium-current-density range to clouding in the characteristic form of an S, if it may be so described, of the sulphur products, which it is difficult to eliminate. Again, these products, in the high-current-density range, give rise to a region of pitting which can only be got rid of by means of a surface-active agent. The choice of the latter was extremely difficult, on the one hand because it was necessary for it to be cation-active or non-ionic, soluble and stable in an alkaline medium, and on the other hand because it must be compatible with the surface-active agent of the Udylite nickel bath.

All the organic compounds capable of promoting cathodic polarization also allow semi-bright deposits to be obtained. It is apparent that the phenomenon of polarization is periodic and that as a consequence the speed of deposition as well as the cathode efficiency are decreased as a result. A certain number of rare metals used, either alone, or simultaneously with other organic or mineral compounds are capable of giving deposits of greater interest, in the sense that they give bright deposits at all current densities, both when using direct current and with periodic reverses or interrupted current.

Patents have been taken out in France in connection with alkaline bright copper plating baths; it is thus hoped rapidly to develop bright nickel plating of parts cast in zinc-base alloys.

Rhodesian Farmer's Unusual Hobby

Probably the only non-professional in Southern Africa capable of casting metal by the lost-wax process is Lt.-Col. Geoffrey Pollitt, of Makalanga Farm, near Mazoe in Southern Rhodesia. Col. Pollitt, whose wife is a sculptress, started learning the craft a couple of years ago, and after initial disappointments and setbacks has now succeeded in casting many of Mrs. Pollitt's works of art.

His furnace, in a corner of the farm workshop, consists of a 44-gall. drum lined with firebricks, let into the ground over a duct bringing an air stream from the fan of an old hammer-mill. A diesel-oil drip ignited in the air-stream is capable of melting 85 lb. of metal in three hours and heating it to as high as 1,500 deg. C. In the illustrations (Fig. 1) the pouring is shown of a bronze alloy of 81 copper, 15 tin, 3 zinc, and 1 per cent. lead, into a plaque casting which took 70 lb. of metal.

FIG. 1 (*a*) *Raking off the slag and* (*b*) *casting an art plaque at Makalanga Farm, Southern Rhodesia.*

Need for Technical Education

Lord Hives presents 1957 *Viscount Nuffield Paper*

Presenting the 1957 Viscount Nuffield paper "Technical Education for Production Engineers—Some Reminiscences and Experiences" to the Institution of Production Engineers on February 6, the Rt. Hon. the Lord Hives, C.H., M.B.E., D.SC., LL.D.,* covered a multitude of topics connected with his main theme and drew largely for illustration and instance upon his 48 years with the Rolls-Royce Company. He pointed out that while, inevitably, his long association with that company was the influence which shaped his observations, he had been in retirement for over a year and no longer had any industrial responsibility. The views which he expressed were, therefore, he said, entirely his own.

The paper covered a wide field of production problems. Lord Hives discussed the need for closer liaison between designing and production staffs. Giving actual examples of the kind of production problems which had occurred in his own field, he described the work which had been done before the Merlin engine could be manufactured in the USA during the last war. He also gave an account of a number of Continental projects which the company had undertaken and spoke of the present universal trend towards the use of metric dimensions. It would appear, he said, that the inch measurement was losing ground, and, although he personally supported its use in engineering, this might lead to considerable difficulties if or when the European Market came into being. There were, too, other examples of non-uniformity—for instance the projection used on drawings and the direction of rotation of propellers.

Need for Technical Education

Lord Hives followed these general observations with more particular ones on a subject which is of immediate interest to foundrymen—that of technical education. He had a number of pungent remarks to make on the UK system in this respect. He would, he said, like to offer his personal views on that much-discussed topic and felt that his remarks would be best placed in their personal context. Over 30 years before, as soon as he had established himself in a position of responsibility, he had seen that it was necessary to engage as some of his assistants, men who had been trained in a university. There was no question in those days of waiting in a queue to engage graduates: their anxiety was whether they were going to get jobs at all, and therefore one received many applications. It was an interesting fact that the graduates who had been engaged by him 25 to 30 years before were now at the head of Rolls-Royce. They filled the following posts: technical director of the Rolls-Royce Company; managing director, the chief engineer, and the general manager of the motor-car division; managing director of the oil-engine division; and assistant chief engineer of the the aero division likewise. The chief executive of the whole Rolls-Royce group had been for many years on his staff. He too was technically trained.

"On reflection," said Lord Hives, "I do not think I would claim that as graduates these men were outstandingly brilliant. I attribute their success first to the policy of the company, which was to invest in talent, but perhaps what contributed even more was the *environment* in which they developed. On the question of environment it had to be remembered that Rolls-Royce at that time was a relatively small company, manufacturing one type of motor-car, and doing very little aero work.

Its personnel had all been influenced by the creative genius of the company—the late Sir Henry Royce. He had been a great believer in doing the development work on the drawing board. He had had infinite patience for detail and all his designs were considered from every point of view—production, reliability, stressing, etc. It followed that the company's best engineers were all designers and had worked on the drawing board. The company's policy of investing in talent had been continuous. It could not have undertaken and made a success of so many projects except for this.

His own approach had been rather practical. He had carried out a survey of all the first-class people with whom he had worked and whose value he could therefore assess, to see which way they had come to the top, and what training they had received. The overall result had showed that there was no particular place of training which showed up the best. This was what one would expect, taking into account the difference in the standard of intelligence of individuals, and the wide range of jobs to be filled in an industrial organization. One could always find a number of jobs for the bright individual to fill: it was the average man one might have difficulty with before he was placed in the right job.

The amount of money industry spent yearly on education was not sufficiently recognized. It could be shown, he said, that industry was spending much more than the University Grants Committee on technical education. The final responsibility for training the majority of technologists, however, ultimately rested with industry.

Shortage of Creative Designers

It was his opinion that the most serious shortage was not scientists, but creative designers. The first qualification for this post was experience: technical qualifications were not, in themselves, sufficient. It was essential that they should have had considerable drawing-office experience, and also practical training. They should be able to work with specialists.

The usual university graduate did not take kindly to drawing-office work; he looked for a more glamorous career in research, development and testing. Industry was largely responsible; there was not sufficient encouragement to create first-class designers. The backbone of most design staffs were men who had served an apprenticeship, with part-time and evening classes at a technical college, and who had taken their "Ordinary" or "Higher" National Certificate of Education. A number of these men turned out to be brilliant.

Technical training in industry was a long-term policy and an expensive process. It was the accepted practice for all graduates, whatever their qualifications, to serve two years in the factory before they were selected for any particular job.

*Lord Hives is chairman of the National Council for Technological Awards. During his 48 years with Rolls-Royce, Limited, he rose from the position of tester in what was then a small company to chairmanship of an industrial organization known throughout the world. In 1951 he received the honorary degree of Doctor of Laws at Cambridge University, and in 1949 the honorary degree of Doctor of Science at Nottingham University. The Paper was presented at the University of Bristol.

Need for Technical Education

"What I believe should prove a better arrangement for university graduates," said Lord Hives, "is the procedure now known as the 'thick sandwich' scheme. Industry selects the student, but before he enters the university he spends one year in industry. After his three years at the university he completes one more year in industry before his initial training is considered complete."

The student was likely to make much better use of his opportunities in the university if he had seen inside a factory and was sponsored by an individual firm. There was no binding obligation on either party. The new DIP. TECH. was chiefly based on the sandwich system, only the student carried out his studies at a college of technology. The generally-accepted arrangement was that the student should be sponsored by an industrial firm, and that he should spend six months in the factory and six months in the college of technology over a period of four years. This was not a new or novel arrangement; it had been proved successful, especially in Scotland, over many years.

He believed, he said, in the DIP. TECH. as a means of increasing the supply of qualified technologists, and expected that it would spread the net wider and gather in some brilliant people who at present were not going to the universities. All were aware that the number of people who were capable of absorbing higher technical knowledge was relatively few, and therefore the desire should be for the net to be spread as widely as possible to gather in all those who have that potential. The DIP. TECH. should do this. In most cases the student would be sponsored by a firm, and the fact that he knew he was returning every six months gave him the satisfaction of continuity. In spite of the satisfactory start of students entering the DIP. TECH. courses, its success had still to be proved in practice.

In the foreseeable future the amount of sheer knowledge the technologist must have would steadily increase. Much more would be demanded of educational facilities. The time of learning had to be more prolonged; its *quality* maintained and raised.

This was the object of the setting up of the National Council of Technological Awards—to guarantee and safeguard the *quality* of the DIP. TECH. and any higher diploma that may be introduced.

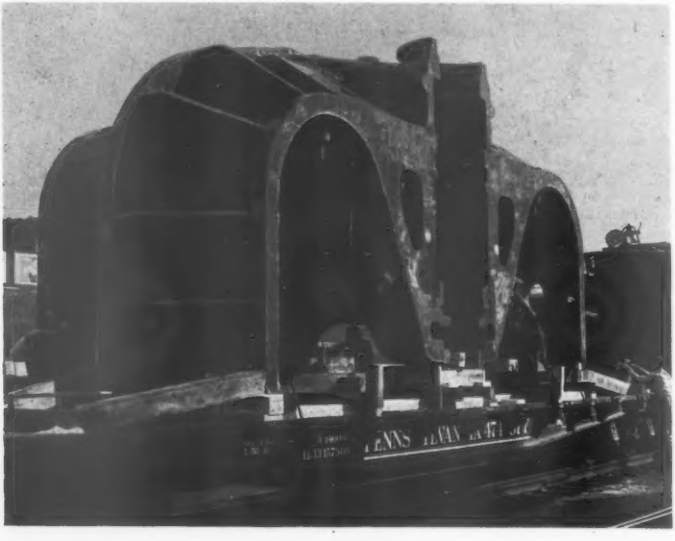
One could not ensure the quality of the qualification without overseeing what the educational authorities provided. The Council, in fact, found the standard of equipment, libraries, buildings, etc., low compared with those of countries overseas. Also there was a general lack of student amenities—playing fields, common rooms, study facilities and the like. Nor were members of the teaching staff as highly qualified as they should be, although there were exceptions, of course.

J. AND H. MCLAREN, LIMITED, of Leeds, have provided the Diesel-lighting set to provide artificial moonlight at "Treetops," the game reserve hotel built into a tree in Kenya. Incidentally, it was here that Princess Elizabeth learned in 1952 she had succeeded to the throne.

GEORGE COHEN SONS & COMPANY, LIMITED, announce that they have purchased the whole of the machine-tool plant which has become available following the decision of Associated Commerical Vehicles, Limited, to close down the works of Crossley Motors, Limited, at Stockport.

ENGINEERING COMPONENTS, LIMITED—Mr. H. Weston Howard has resigned from the board in order to devote more time to the interests of Hayward Tyler & Company, Limited, the Luton pump manufacturers.

SANDIACRE PARISH COUNCIL have complained about the Excelsior Foundry, lying idle for nearly two years on the Nottingham-Derby road, and are urging the owners, Allied Ironfounders, Limited, to sell the property. The Council claim that 150 people were thrown idle when the foundry closed, and now the Council is losing valuable rates.



American Turbine Casting

The accompanying illustration shows a large casting recently loaded in America for transit by rail. It is a 58-ton, cast-iron turbine base casting measuring 29-ft. long, 12-ft. 2-in. high and 9-ft. wide, recently moulded at the foundry of the American Westinghouse Electric Corporation at Trafford, near Pittsburgh, Pennsylvania. The casting was despatched to the company's South Philadelphia works, where it will be machined and assembled with an 80,000-kw. steam turbine for a power company located in the Eastern United States.

Notes from the Branches

Birmingham

The January meeting of the Birmingham branch of the Institute of British Foundrymen was held at the James Watt Memorial Institute when approximately 120 members, including a party of 30 from the Coventry section, were present to hear a lecture by Mr. T. C. Wilson, foundry manager of J. Blakeborough & Sons, Limited, give a talk on "The CO_2 Process at Blakeborough Foundries."

Mr. Wilson illustrated his talk with an excellent strip film, and showed many examples of cores and castings, made by his firm, which involved the use of the Process. Of particular interest were the cores for large valve-bodies and some sluice-gates. He went on to give details of how the Process had been adapted to suit the mechanized plant, and illustrated the layout and operation of the sand hopper, blowing point and the gassing track.

The many changes involved in adapting the Process, Mr. Wilson said, had been carried out within a year and results had been very satisfactory. For instance, substantial savings had been achieved by the fact that core-plates were no longer necessary (100 tons had been scrapped) neither were core rods, and stoves were now but rarely used. Considerable savings had also been made in labour; where previously 40 men had been working on the night-shift now there were only four. Working conditions were greatly improved, and the foundry was much cleaner. Mr. Wilson concluded by giving credit to his firm's work-study team who had ensured that maximum economy was achieved on the introduction of the CO_2 Process.

In proposing the vote of thanks, Mr. Hird said that the interest in such a practical paper was obvious from the fact that there was "standing-room only" and in concluding he remarked that it was up to the foundry industry to make the best of this new tool. In seconding the proposal, Mr. J. R. Smith, said that it was clear that a sound engineering job had been made of the introduction of the CO_2 Process at Blakeborough's. He also remarked upon the good work done by the work-study team and concluded by saying that members should be grateful to Mr. Wilson for coming to Birmingham despite the bad weather to present his paper and film. An interesting discussion followed and the meeting closed at 9 p.m.

London

A special meeting to which apprentices in the whole of the London area were invited was organized by the London branch on January 29. Some quite large parties came along and altogether it is estimated that some 160 members and guests were present. Consideration of "Sticky Problems" was the theme of the meeting, which was compered by the president, Mr. A. Talbot. A small panel of experienced foundrymen, consisting of Mr. B. Levy, Mr. Geo. C. Pierce and Mr. F. Hudson, F.I.M., were present to answer questions impromptu. The first question was about dimensional shrinkage allowances on a pattern for a large dome-shaped casting to be made from a segment pattern, and this brought forth an erudite reply (in two sections) from the pattern-making member of the panel, Mr. Levy. Afterwards, questions and answers came thick and fast and a great variety of subjects was covered. These included, How do foundries not equipped for radiography "prove" their simple castings? What are the advantages of epoxy-resin patterns over metal? How do the City & Guild's examinations rate in this country and how do they compare with those on the Continent? What is the future for skilled jobbing moulders? Will fibreglass-based patterns take the place of metal patterns for miscellaneous metal shapes? The president complimented the apprentices on their lack of shyness and the obvious enthusiasm with which they had entered into the proceedings; a noteworthy feature being that they came up to the head of the meeting to ask their questions. Several awards were made by the branch president to boys asking particularly good questions or those to which the panel had no forthright replies —the result being that quite a number of apprentices went home the richer by boxes of 50 cigarettes.

Lancashire

At a meeting of the Lancashire branch, held early this month at the Midland Hotel, Manchester, a paper entitled "Health and Safety in the Foundry Industry" (illustrated by a ciné film) was delivered by Mr. E. Waller, deputy superintending inspector of factories. The chairman, Mr. E. Beech, first introduced Mr. Waller, who then dealt with events leading to the production of the Garrett Report of 1947, and, later, the Iron and Steel Regulations of 1953. He gave figures on accident frequency rates in foundries and described methods of accident reduction. His film showed how dust-extraction methods could reduce the incidence of industrial disease.

Discussion

A MEMBER asked what type of masks were recommended for founders.

MR. WALLER said that approved respirators, such as the Mk. 4 should be worn, and for such jobs as fettling or wherever dust concentrations were to be found. A new type was now being developed to overcome perspiration difficulties.

MR. E. LONGDEN said he thought men working inside cupolas should wear armoured suits supplied with pressurized air, similar to shotblasters, and helmets. He contended that costs incurred by firms in conforming to the Regulations should be passed on to customers, and added that increasing mechanization of foundries was helping to solve some of the health problems.

MR. WALLER agreed that cupola-men should wear pressure-suits, also blast-furnace men. How to spread the increased costs incurred as a result of the introduction of the Regulations was a matter outside the scope of his department, but all taxpayers would benefit by improved health conditions in factories.

A MEMBER asked for a clarification of the employer's legal position in the case of an employee who refused to use materials provided for ensuring his health and safety.

MR. WALLER, in reply, said if the occupier had done all he could, the employee was open to prosecution at law, and if injury arose, he may, due to contributory negligence, receive no compensation, or an award of compensation might be reduced.

MR. KIRKHAM said he thought figures quoted for the incidence of silicosis were misleading, as many men working in foundries had previously been employed in mines, and it was difficult to compile a case-history for each man, which was necessary if reliable figures were to be built up.

MR. WALLER agreed that a foundryman who had also been a miner was a difficult case to take account of. His figures showed the gratifying fact that the silicosis frequency-rate was being reduced for iron foundries. The rate of examination was also important and examining doctors were not always available.

(*Continued on p.* 216, *foot of col.* 2)

Foundry Coke Trade

Stock Position Stressed at Merchants' Dinner

Members and guests of the Foundry Coke Merchants' Association (FCMA) learned at their annual dinner on February 13 that the National Coal Board has over a million tons of coke in stock at the moment. They were invited to draw the inference that an increase in the output of castings would be greatly appreciated!

The dinner—the ninth annual event of its kind—was held at the May Fair Hotel, London, Mr. Edwin Tasker, the Association's chairman, presiding. Supporting the chairman at the high table were Mr. R. J. Moffat, C.B.E., Director-General of Marketing, National Coal Board; Mr. N. P. Newman, J.P., president of the Joint Iron Council; Mr. J. Blakiston, M.I.MECH.E., president of the Institute of British Foundrymen; Mr. J. I. Willis, Deputy-Director of Marketing, NCB; Mr. J. Y. Feggetter, Divisional Marketing Officer, Durham Division, NCB; Mr. C. R. Wheeler, C.B.E., president-elect of the Iron and Steel Institute, and joint managing director, Guest Keen Iron & Steel Company, Limited; Mr. Leslie O'Connor, C.B.E.; Mr. Arnold Carr, president of the Refractories Association of Great Britain (past-chairman, FCMA); Mr. R. H. Thornley, managing director, Ideal Boilers & Radiators, Limited; Mr. H. H. Prosser; Mr. C. F. Sullivan, manager, coke by-products, S.W. Division, NCB; Mr. M. M. Hallett, M.SC., vice-chairman of the Council, BCIRA; Mr. W. Armstrong; Mr. V. E. Upton; and Mr. Barrington Hooper, chairman, Industrial Newspapers, Limited.

MR. MOFFAT, responding to the toast of the guests, proposed by the chairman, said that at the end of 1957 the NCB had 1,250,000 tons of coke in stock. Therefore, unless ironfounders made many more castings he would be in difficulties. MR. H. W. REID also made a brief response to the toast.

MR. NEWMAN, proposing the toast of the Association, first made a brief comment on Mr. Moffat's reference to the stocks of foundry coke, remarking that if he was looking to iron castings to absorb a million tons of foundry coke he was expecting a miracle. On the future prospects for ironfounders, his personal views were somewhat mixed. On the good side, it was reasonably safe to assume that certain sections, namely, automobile castings, railway castings, ingot moulds, and colliery castings would be on the upgrade, generally speaking. At least, he thought the output of the foundries concerned would not be down on the average of last year. But the output of iron pipes, general engineering castings (a very wide field) and the general jobbing industry, and certainly the output of building and domestic castings, cookers, baths, and so on, were on the down side. He thought it reasonable to assume, unless there was a very great change in the next year, that the industry would be at least down on total, although not seriously so.

What of the future? Some time ago the industry had been asked to forecast the total annual production of iron castings by 1962. The figures ultimately given were based on certain Treasury suppositions, with which the ironfounders did not necessarily agree, for they did not know the facts on which the whole of the suppositions were made; but they had forecast a total production of 4,500,000 tons by 1962. It was not felt necessary at this stage completely to revise this forecast, but the Iron and Steel Board had been advised that it might be a year or two more before that target was reached.

We were facing inflation, Mr. Newman continued, and there was a credit squeeze, but the position could change almost overnight from inflation to deflation. The Government, at the right moment and regardless of party politics, would have to go into reverse and deal with deflation. That position would arise sooner or later; and it was not always easy to recognize it. He would not try to make light of the position.

Focus on Salesmanship

A recession was taking place in the United States. In his own particular line of business there had been a considerable recession in the Canadian market during the last year, particularly in the oil and natural-gas industries, and he believed the position there had not quantitatively improved in the current year; that was also the case in the United States. However, we should not be too alarmed. When the Americans said there were 4,500,000 unemployed that was not comparable in any sense with the figure for unemployed in this country, because the American figure covered very short seasonal changes. About this country, Mr. Newman was not depressed; he thought we had returned to more normal conditions, and one of the things which he was sure the members of the Foundry Coke Merchants' Association had to grapple with, as he had to do in his industry, was the necessity for salesmanship. Young men who had come into the selling field since the last war had never really known what it was to sell. They had to wake up to the fact that they had to sell. To see first-class American salesmen in operation was an education; not only had they complete confidence in their product, but they could sell it; we had to learn to do that.

MR. W. PRATT, responding, expressed the thanks of the Association to its many friends in the Coal Board and to Mr. Newman and his industry for all the help they had given over the years.

UK Foundry Plant Consortium

British Consolidated Foundry Plant Manufacturers is a group which was formed last August and is commencing trading now and co-ordinating the exports of the following five British manufacturers of foundry plant and equipment:—Acme Conveyors, Limited; Coleman-Wallwork, Limited; Metalectric Furnaces, Limited, Paterson Hughes Engineering Company, Limited, and Tilghman's, Limited. It is the intention of this group that this export consortium, covering maybe the widest range of foundry plant and foundry machinery manufactured in this country, should promote the interest of the British foundry plant and machinery manufacturing industry generally and the sale of member companies' products specifically.

Notes from the Branches

(Continued from p. 215)

MR. LONGDEN, stressing the seriousness of the matter, mentioned the report about a foundry where 75 per cent. of employees engaged on a certain class of work were said to be suffering from pneumoconiosis.

MR. WALLER held that, generally speaking, if the cause of industrial disease were known a cure could be effected, and cited the case of the woollen industry, where anthrax had been cured; the only cases now being reported were from farms, and not factories.

Closing the discussion, the chairman said he was gratified to know that so much progress was being made and thanked Mr. Waller for his able exposition of the whole problem of foundry health and safety.

American Technical Papers

Papers of interest to foundrymen were included in the wide range of material which was presented at the World Metal Congress in Chicago last November, and during the various symposiums—devoted to uranium, to general metallurgy and to steel-making processes—the following contributions were made.*

Development of Casting Techniques for Uranium and Uranium Alloys

G. E. Jaynes†, D. T. Doll†, and J. M. Taub†

Micarta tube and double-walled, water-cooled, steel tank furnaces used for the vacuum melting and casting of uranium were described. Vacuum pumping systems and high-frequency power-generating equipment were brought up for discussion and an account was given of experiments in which uncooled induction coils were successfully used to melt small heats of metal. Information was offered about the use of graphite crucibles and moulds and the application of refractory coatings to prevent crucible-metal and mould-metal reactions. The casting process covering furnace set-up, pouring temperatures, mould temperatures, out-gassing, post-heating, casting recovery, and crucible and mould clean-up was discussed. The casting of uranium alloys using induction stirring of the melt to promote homogeneity in the casting was another point raised. Mention was made of experiments in which castable refractories, glascast, and copper had been used as mould materials.

Centrifugal Casting of U-Zr Alloy Rods

A. B. Shuck

In this paper, the development at Argonne National Laboratory of methods and equipment for the centrifugal casting of fuel slugs for the Experimental Breeder Reactor I was described. Enriched uranium-zirconium alloy was melted and poured under high vacuum into precision copper moulds, arranged radially about a vertical-axis spindle, to produce radiation-resistant fuel slags.

Processing and Properties of Cobalt-Platinum Permanent Magnet Alloys

D. L. Martin

The author, who is attached to General Electric Company, describes the results of processing and heat-treatment studies of 40 to 60 atomic pct cobalt-platinum alloys. The permanent magnet properties were found to be related to the composition, the solution temperature, the cooling treatment from the solution treatment, and the final ordering treatment.

The best properties of 4700 oersteds, coercive force and nine million gauss-oersteds, energy product were obtained on an alloy near the 50 atomic pct composition by controlled cooling and ageing.

Vacuum Arc Melting

E. W. Johnson

Arc-melting in chilled crucibles, said the author, was becoming increasingly important as a method of producing sound, high-quality products without atmospheric or crucible contamination. Three variations of arc-melting were: (1) with inert atmospheres and non-consumable electrodes, (2) with inert atmospheres and consumable electrodes and (3) with consumable electrodes in vacuum. Method (3) was superior for most applications and was expected to have the fastest development and growth.

Of major importance in the development of vacuum arc-melting was the collection of new, fundamental information on the behaviour of high current arcs at reduced pressures. Work in this new field was proceeding vigorously, and many worthwhile results had been obtained.

From consideration of the current capabilities and limitations of consumable electrode vacuum arc-melting it was expected (1) that the method would be applied to an increasing number of alloys, (2) new alloys having superior properties would be developed to take particular advantage of the capabilities of the process, and (3) the process would become increasingly versatile and economical, permitting further increases in the number and variety of materials which will be vacuum arc-melted.

Hadfields Expansion Plans

Voicing the "very great disservice" which is being done to the national well-being by Labour Party declarations on renationalization which have artificially debased the market quotations for steel shares, Lord Dudley Gordon, chairman of Hadfields, Limited, states in his annual review that the threat of renationalization has added to such difficulties as the increased Bank rate and credit restrictions in raising fresh capital for industrial expansion.

It had even been claimed that such a state of affairs was desirable so as to frighten speculators, headed with the catchphrase "All should share steel prosperity," as though shares were held by a few rich persons. Hadfields' figures were typical of the industry. More than half of its 11,000 shareholders owned 100 shares or less and the total of those who owned 500 shares or less was over 10,000. The united purpose of shareholders, employees, and customers must be to ensure that the industry, which was basic to so many others, should cease to be a shuttlecock of politics and be allowed to continue unhampered.

Plans for important additions to the steel-melting plant were, for all practical purposes, complete and the difficulty remaining was how to finance such a project under present conditions.

With the unchanged 9 per cent. dividend total, group profits, before tax, fell from £1,335,482 to £1,131,734 in the year to September 28, 1957. Two developments during the year were the formation in Canada of a new company, Hadfields (Canada), Limited, to develop sales of Hadfields products in North America, and the formation of Millspaugh Wimpey, Limited, in which Hadfields' main subsidiary, Millspaugh, now owns a half share, to operate as engineers, contractors and consultants to the pulp and paper industry.

---

* Brief abstracts of other papers presented on this occasion appeared in FOUNDRY TRADE JOURNAL on November 14, 1957, and November 28.

† Los Alamos Scientific Laboratory.

American Letter

Automobile Scrap in the US

The production of 6,000,000 automobiles containing 1½ (short) tons of metal in each provides an outlet for 9,000,000 tons of finished product annually in addition to the clippings, turnings, croppings and scrap accompanying manufacture. In the course of time, the 9,000,000-ton production becomes exactly that same quantity of scrap. It is upon this balance between production and scrap that the economy of the automobile industry depends to no small degree. A survey compiled by the *Waste Trade Journal of New York* and abstracted in Table I below illustrates the proportions of metals which are reclaimable from automobile scrap.

TABLE I.—*Metals Reclaimable from Automobile Scrap.*
(Metal Weights in Pounds.)

Year.	Type.	Iron.	Steel.	Alum. alloy.	Copper alloy.	Lead alloy.	Zinc alloy.
1956	Chevrolet ..	537	2,128	8.8	28.7	31.8	45.3
1950		463	2,175	3.4	40.1	30.5	30.0
1956	Pontiac ..	649	2,318	14.0	31.5	22.2	34.6
1950		558	2,274	3.3	44.3	31.4	42.1
1956	Oldsmobile ..	652	2,529	16.2	33.3	35.3	52.5
1950		644	2,282	12.7	44.9	33.2	74.2
1956	Buick	681	2,804	49.2	34.9	31.3	102.7
1950		628	2,500	11.9	43.2	28.2	44.8
1956	Cadillac ..	681	2,989	47.4	34.7	34.9	75.9
1950		649	2,680	16.9	48.5	27.7	53.4
1956	Chevrolet-type	583	1,984	8.7	25.6	28.4	22.1
1950	small truck	507	2,069	2.4	33.6	27.4	14.9
1956	G.M.C. type	934	3,310	16.5	42.4	28.1	25.3
1950	heavy truck	662	3,442	19.8	47.2	26.3	15.2
1950	American Motors (Nash)	620	2,550	11.5	41.5	30.4	66
1955	Chrysler-Plymouth type	411	2,465	68	12	24	20
1950	Ford (Mercury)	604	500	("Steel" includes *only* doors, transmissions and rear axle)			
1956*	partial	628	432				
1957†	components	602	519				

* Standard transmission.
† Automatic transmission.

A 1950 car built by the American Motors Corporation showed for a car weight of 3,824.1 lb. the following quantities: steel, 2,556.3 lb.; grey iron, 521.2; malleable iron, 99.6; aluminum and alloys, 11.4; copper, 26.0; copper alloys, 15.6; lead and alloys, 30.4; zinc and alloys, 66.1; antimony, 1.1; chromium, 6.1; manganese, 18.8; molybdenum, 0.1; nickel, 1.1; silicon, 17.4; tin, 1.4. An itemized breakdown of the metals in a Plymouth model Chrysler for 1955 is shown in Table II.

TABLE II.—*Itemized Breakdown of Metals in a Plymouth Model Chrysler.*

Material.	Weight in lb.
Metals:	
Steel	2,338
Cast iron	411
Copper	12
Brass	20
Aluminium	68
Die castings	21
Stainless steel	26
Lead	24
Bronze	3
Solder	11
Plated metals: ..	
Nickel	4
Copper	0,15
Chromium	0.07

One of the most interesting facts that becomes apparent from the survey is the steady rise in the use of aluminium (by weight), as well as the reduction in copper weight. Steel and iron use does not show too much variation. In general, cast-iron usage increased by 5 to 10 per cent. in most models while steel increased in the larger models but decreased in the smaller, popular models.

US Economic Forecast

Forecasters of 1958 business prospects have predicted a six-month period of slow recession and stabilization before any improvement occurs. A surplus of goods and inventories seems to have accumulated which will take time to deplete. The depletion process is expected to progress in an orderly manner because consumer buying power is sustained through unemployment insurance and similar supports. A leading economist explains the changed climate in the US as having moved from its former "boom-and-bust" cycle, which was accompanied by lowered prices, lost profits and increased bankruptcies, to a pattern in which the cycle moves only up and up.

Periods of stabilization occur in this pattern which is largely brought about by supports such as non-receding labour rates and unemployment insurance, etc. Manufacturers and producers of commodities such as metals met the recession by correspondingly reducing their outputs and the above factors prevent cost-recession and accompanying price-reduction. A period such as this is now occurring. Unemployment has risen to approximately 5 per cent. of the labour force, or about 3,500,000 unemployed, with much talk about possibilities of an increase as great as double this amount. The first evidence of over-supply registers in the labour force through the elimination of overtime followed by cutting back the working week and, in cases of especial severity, the occurrence of lay-offs. These factors have stimulated competition so that business for the foundries becomes more difficult and the consumer bargains for more quality or lower prices. In an appreciation of the over-all problem, the government is applying counter-measures such as easier credit to keep in motion an economy that is still high but has slowed up slightly.

Davy & United Sells Sugar-machinery Business

Booker Engineering Holdings, Limited, a member of the Booker group of Commonwealth merchants and sugar producers, has purchased Duncan Stewart & Company, Limited, Glasgow, the sugar-machinery business of the Davy & United Engineering Company, Limited. The deal is believed to have involved about £250,000.

Duncan Stewart & Company will continue to operate under the present staff in charge of sugar machinery, but from new offices. Ownership of the works and premises has been transferred to the Davy & United Engineering Company, and these will continue to operate as part of the group. Certain manufacturing facilities will continue to be available for Duncan Stewart & Company at the Glasgow and Sheffield works of Davy & United.

The directors of Duncan Stewart & Company will comprise Mr. C. W. Murray, who joins the board in a part-time capacity and who will be appointed chairman; Mr. K. S. Arnold, director and general manager, who will be appointed managing director; and Mr. R. J. McBride, a senior executive, who will be appointed an executive director.

Special difficulties *confronted Edmondo Quattrocchi when he was selected to execute a bust of George Westinghouse, one of America's greatest inventors, for the Hall of Fame in New York University. He had to work from photographs (a) and there were very few of these in existence. Steps in the process by which the final bronze bust was made can be seen at (b) which shows the first rough clay model being broken into four segments with brass strips so that it can be moulded in plaster of Paris, at (c) where the sculptor adds finishing touches to his final model, and (d) in which he checks proportions with a pair of calipers before casting the bust in bronze. In (e) former US president Herbert Hoover is seen with George Westinghouse III, 11-year-old great-grandson of the inventor, after the unveiling ceremony.*

Publications Received

BCIRA Journal of Research and Development. Published by the British Cast Iron Research Association, Alvechurch, Birmingham.

Four research reports are included in this issue. The first is from Mr. C. T. Moore on the "Dependence of Decarburization on Rate of Graphitization in Whiteheart Malleable Iron." The author has drawn the following conclusions from his work:—

(1) Materials consisting of temper carbon and austenite decarburize in CO/CO_2 atmospheres less rapidly than materials consisting of iron carbide and austenite. When the manganese is adequate to balance the sulphur content this effect is slight but when the sulphur content is not balanced the effect is marked.

(2) Decarburization in CO/CO_2 atmospheres of graphitized irons with unbalanced sulphur contents appears to take place by depletion of carbon in the austenite without the solution of graphite completely compensating this loss.

(3) Whereas less carbon is eliminated in irons of unbalanced sulphur contents, particularly when pregraphitized, the effect of the decarburization penetrates more deeply.

(4) The retention of temper carbon near to the edge of the sample, the corresponding depletion of carbon in the matrix at the centre, and the effect of an increase in nodule number in increasing the rate of decarburization, shows that the rate of solution of graphite in austenite is a controlling feature of the decarburization process when the material is partly or wholly graphitized. If this is correct, it appears that one effect of sulphur uncombined with manganese is to retard the solution of graphite in austenite.

(5) Experiments at relatively lower temperatures with white irons which did not graphitize indicate that the rate of decarburization of these irons decreases with increase in the sulphur:manganese ratio. This might be due to different solution rates of carbide in excess sulphur and balanced sulphur irons.

(6) Heating and cooling graphitized irons through the austenite transformation range reduced subsequent decarburization. This could be due to the formation of a gap between the graphite and the austenite arising from the differential expansions and contractions on passing through the transformation range.

The second report recommended by the reviewer concerns some work initially carried out in France, where a Professor at a Northern university carried out experiments on what was translated as the "churning" of liquid cast iron with the objective of improving its properties. This present report, from Mr. R. I. Higgins and Dr. J. C. Billington, is on the "Recarburization of Molten Iron in a High-speed Rotary Vessel," and the conclusions drawn are set out in the following statement:—

It has been shown that molten iron can be extensively recarburized by using a low-grade coke breeze, provided that there is sufficient agitation. It has been demonstrated that a high-speed rotary vessel can supply adequate agitation to increase appreciably the rate of carbon solution from coke breeze or electrode carbon, and that higher speeds of rotation encourage faster solution times. In a vessel approximating to the 20-ton Kalling desulphurizing vessel the peripheral speed would be some six times greater than that achieved in small-scale experiments and it is believed that this would appreciably increase the rate of solution of the carbon. These experiments encourage the belief that extensive recarburization of molten iron might be conveniently achieved at low cost on a tonnage scale by dissolving coke breeze in the iron in a high-speed rotary vessel. There is evidence to show that the carburization of molten iron by cold graphite is accompanied by a substantial temperature drop and a diagram has been constructed from theoretical data to show the magnitude of this effect for all iron/carbon alloys up to 5 per cent. carbon, which are liquid below 1,600 deg. C.

The third report printed in this issue, on the "Effect of the Size of K-bar Test Castings on Their Shrinkage Defects," by Mr. T. J. Szajda, is an excellent example of a case where test-bar dimensions arbitrarily selected have been examined to ascertain their real worth. The reviewer considers that quite a few other cases could be usefully scrutinized in a similar manner. The author's conclusions as set out below make interesting reading:—

(1) Different sizes and designs of K-bar test castings are most prone to particular shrinkage defects, but to obtain the most sensitive test a number of castings of different sizes should be used together.

(2) Internal porosity increases with the size of the castings. Increase in size is also accompanied by a decrease in surface area:volume ratio.

(3) Sinks and "draws" occur by preference in certain positions in the K-bar test-castings and these positions vary slightly with the size of the castings and also with the composition of the metal. The ratio of the number of sinks or draws in one position to that in another may be used to compare the susceptibilities of different compositions or other variables.

(4) The incidence of drawing and sinking is dependent on the pouring temperature. In these tests, the maximum amount of drawing was obtained with a pouring temperature of around 1,450 deg. C. With the pouring temperature decreasing over the range 1,450 to 1,415 deg. C., draws were replaced by sinks, *i.e.*, the number of sinks progressively increased as the pouring temperature decreased.

(5) The influence of design factors on shrinkage defects in K-bars has been discussed. It is probable that the behaviour of a given K-bar casting depends upon the degree of "hot-spot" concentration, the temperature of metal actually entering the casting, the sharpness of individual re-entrant angles, and the size of the casting as related to the surface-area:volume ratio, and the relative importance of some of these factors has been suggested.

Steel Review, No. 9. Published by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

The iron and steel industry can indeed count itself fortunate in having available this high-grade quarterly magazine, in which to keep its members well informed as to production, import, export and stock statistics, and to provide excellent information as to some of the lesser-known services which the Federation provides. This issue deals with the mining of iron ore and its transport to blast furnaces. The standard of illustration, and the layout achieved in the magazine is of a very high order.

Selected British Technical Journals. A list, published by the Federation of British Industries, 21, Tothill Street, London, S.W.1; price 2s.

The objective of the 16-page booklet is to provide present and former Federated British Industries' overseas scholars, and other overseas engineers trained in Britain, with details of the source of the major technical journals published in this country. It is, as noted above, also available to the general public.

Book Review

Jahrbuch der Oberflächentechnik, 1958. Published (in German) by Metall-Verlag GmbH, Berlin-Grunewald; price DM 19.50.

This comprehensive handbook of surface treatment contains a range of excellent articles covering about 700 pocket-size pages. Each provides a concise review of one particular field and gives in most cases also an up-to-date bibliography of Continental, British and American publications and papers. The first article deals with prefabricated panels and curtain walls made from stainless steel, enamelled iron or anodized aluminium for covering the front of buildings—which method was first used in 1930 for the Empire State Building in New York. The next article deals with corrosion problems and surface treatment in nuclear reactor plant, this is followed by articles dealing with the economic handling of lubricants, the manufacture of grinding wheels, modern degreasing methods—including ultrasonic cleaning and pickling, acid proof materials, salt bath methods and electro-polishing.

The next series of articles deals with further protection of galvanized, anodized or electroplated surfaces, the tarnishing of silver and its prevention, the passivation of oxide films by chemical or electro-chemical methods, the deposition of precious metals on surfaces for electro-technical purposes, electroplating of sintered-metal products, micro-hardness testing of galvanized or otherwise treated metals, metallization of plastics, enamelling, wash-primers and the application of silicones in metal finishing.

Finally there is a (140-page) review of the literature, published in 1956/57, on all kinds of subjects concerned with surface treatment, *e.g.*, from electroplating to gamma-radiation damage, studies of organic protective coatings and gaskets, and from enamelling of aluminium to ceramic materials for rockets.

O. P. EINERL.

House Organs

Le Grand Magazine. The December issue records the fact that Mr. E. K. Whipp from the experimental works office of Fairey Aviation, Limited, has sent a "thank-you" letter to the staff of Western Foundries (one of the Le Grand, Sutcliffe & Gell Group) for their contribution of component castings for the "Fairey Rotodyne" aircraft. Notes are included congratulating S. L. May, R. Sayers and P. Angel, "Western Foundries" students in foundry classes at Borough Polytechnic, on passing their City & Guilds examinations. Brian Bowers, another apprentice, is recorded as having been successful in the Lancs & Cheshire Certificate examination from Slough Technical College. It is he who has recently returned from a "bonus" trip to Italy at the expense of directors of the company, where he visited several foundries in Milan and Turin. Other news in the booklet performs that useful function of informing the staff of the various divisions about the doings of their colleagues and the major operations undertaken by the group.

The Forge, vol. 1, No. 1; issued by the Brockhouse group of companies, 25, Hanover Square, London, W.1.

This new house organ is mainly to be circulated externally and to subsidiaries at home and overseas to tell them about the general activities of the group. It is to be published quarterly and will carry descriptions of the plant and processes installed by the various companies of the group. This first issue contains a well-illustrated account of the mechanized foundry of R. J. Hunt, Limited. The reviewer found the notes from the chairman's annual review interesting.

As this is the first issue and, presumably, comments on its format will be welcomed, the following suggestions for the improvement of the magazine are submitted:—The addresses of the subsidiary companies could usefully be included. If a high proportion of the issue be destined for overseas, then it is suggested that the comic cartoons be eliminated, because what is humorous to the home reader so often falls flat overseas; the same sense of humour is seldom shared between nations.

Foseco Foundry Practice, No. 129; issued by Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7.

This is a special issue, commemorating the Silver Jubilee of the establishment of the company in 1932, and, appropriately, it carries a message from two of the founders, Mr. E. Weiss and Dr. Strauss, now respectively managing director and chairman. Included in the publication there is a year-by-year calendar outlining the major "milestones" in the company's development. It carries its usual quota of technicalities in the form of short articles and hints.

Wild-Barfield Heat-treatment Journal, vol. 6, No. 45; issued by Wild-Barfield Electric Furnaces, Limited, Otterspool Works, Watford By-pass, Watford.

This magazine is not entirely devoted to heat-treatment. For instance, in this issue there are articles covering a melting plant installed in Canada and a shell-mould baking oven installed in a large automobile foundry. The output of the latter is stated to be of the order of 120 boxes per hour.

Ruston Overseas News, vol. 2, No. 24; published by Ruston & Hornsby, Limited, Lincoln.

Contained in this issue is a well-illustrated description of the now fully-operative research centre of the company, which is rated amongst the best equipped in Europe.

New Catalogues

Aluminous Cement. The Lafarge Aluminous Cement Company, Limited, 73, Brook Street, London, W.1, has issued a 32-page, rather austere booklet which rightly stresses that the same basic material, *Ciment Fondu*, can be used as quick-setting cement, as a corrosion-resisting aggregate, as refractory material—using heat-resisting aggregates—up to 1,350 deg. C., and as an insulating concrete (up to 1,000 deg. C.). For each of these applications, one numbered section of the booklet is devoted, elaborating methods of employment of the material. The publication is addressed to the works or maintenance engineer, but its perusal by any works executive is recommended.

Works Signs. A 40-page catalogue received from Bribond, Limited, Burgess Hill, Sussex, illustrates a line of weatherproof works signs which are based on a core of resin-impregnated fibrous material. This is bonded on both sides with sheets of lithophone impregnated with colourless resin. One of these surfaces is placed on the required printed matter, over which is then placed a sheet of material carrying a high percentage of bonding matter. The pack is then cured at 135 deg. C. and a pressure of 1,000 lb. per sq. in. to produce a quite attractive notice board.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

785,726. Fordath Engineering Company, Limited, Hamblet Works, Albion Road, West Bromwich.

Manufacture of cores, especially those which are of large size and have substantial projections or overhang. Added to a cold dry sand of suitable grain-size is a core-forming material. This consists of 1.5 to 2.5 per cent. by weight of the whole of a suitable oil binder, plus 0.02 to 0.20 per cent. by weight of the whole of calcium hypochlorite.

785,823. H. J. Daussan, 9, Rue de Verdun, Metz (Moselle), France.

The casting of iron and its alloys (cast iron and steels) in ingot moulds. The invention claims to eliminate all non-metallic inclusions, even those in the heart of the ingot far from the surface, and even in the most difficult cases of bottom pouring of high-viscosity steels. It also claims to avoid bottom splashes in the most difficult cases of top pouring. This is obtained by coating the internal surface of the ingot with a mixture of one or more carbonaceous substances having sufficient water of crystallization and/or constitution that the coating contains a portion of said water before casting (even when the casting is dry under the effect of the room temperature or of the temperature of about 60 to 80 deg. C. of the mould following on a previous casting operation).

785,824. A device for coating ingot and other moulds. To be studied in conjunction with Patent No. 785,823.

785,837. George Harrison, 6901 West 30th Street, Chicago, Illinois, USA.

A method and apparatus for making castings of metals and alloys of high-melting point such as aluminium and its alloys. It is also one of the objectives of the invention to provide a method whereby the molten metal enters the mould cavity with the minimum of turbulence.

785,984. Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7.

Manufacture of metal ingots and castings; the invention is also concerned with the casting of steel and other metals in ingot form. The objective is to increase the efficiency of mouldable exothermic materials by reducing the loss of evolved heat to materials other than the ingot or casting-head metal. This is achieved by a sleeve which has an outer layer (*i.e.*, that which does not come into contact with the molten metal) constituted of a heat-insulating material; and an inner layer, which contains the molten metal consisting of a mouldable aluminium containing exothermic material. The layers are bonded firmly together. The mouldable aluminium material used is described in Patent No. 627,678.

786,213. Addph Razdow, 158, Montclair Avenue, Montclair, Essex, N.J., USA.

Apparatus for, and method of, dimensional inspection of mechanical parts in general, of blades or vanes for example in turbines, axial-flow compressors or similar, in particular. One objective of the invention is to provide an apparatus for making precise castings of an adequate number of sections of the fir-tree turbine blade or any other irregular object along an appropriate predetermined axis.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

TEES VALLEY, March 12—Supply of materials for Water Board includes spun-iron concrete-lined pipes, 3- to 27-in. dia.; spun-iron pipes, 2-in. dia., 4 metres long, unlined; cast-iron concrete-lined pipes; cast-iron specials, unlined; cast-iron surface boxes. Documents from E. A. Morris, Water Board Offices, Corporation Road, Middlesbrough.

ORPINGTON, March 1—Requirements of Urban District Council include street name plates and traffic signs. Documents from the Engineer and Surveyor, Civic Offices, The Walnuts, High Street, Orpington.

READING, March 21—Spun-iron rising main and ancillary manhole and other chambers and pipeworks required by County Borough. Documents and particulars and specifications obtainable from and plans inspected at the offices of the consulting engineers, Howard Humphreys and Sons, Victoria Station House, Victoria Street, Westminster, S.W.1, from February 17 to 28, between 10 a.m. and 4 p.m. Deposit £5 5s., made payable to the Corporation.

HASLINGDEN, March 1—Materials required by Borough Council include castings. Documents from the Borough Surveyor, Municipal Offices, Haslingden, Rossendale, Lancashire.

GUILDFORD, March 10—Construction of following for Ash Vale Main Drainage: Cast-iron sewer, 600 yd. of 12-in. dia.; 650 yd. 9-in. dia.; and 7,500 yd. 6-in. dia. Documents from J. W. Snape, Engineer and Surveyor, Millmead House, Guildford. Deposit £10 10s., made payable to Guildford Rural District Council.

BENFLEET, February 28—Requirements include cast-iron goods. Documents from the Engineer and Surveyor, Council Offices, Thundersley, Essex.

JARROW, DURHAM.—Supply of materials during the 12 months ending March 31, 1959, as and when schemes are initiated, include rainwater goods and soil pipes, and copper pipes and fittings. Applications to the Borough Engineer, Town Hall, Jarrow.

ROYTON, March 3—Supply of following for Urban District Council: Cast-iron manhole covers and frames and gully frames and grids. Documents from Kenneth Halliwell, Town Hall, Royton, Lancs.

TURTON, February 24—Supply of materials for Urban District Council includes cast-iron gully grates and manhole covers. Documents from Reginald Dart, Engineer and Surveyor, Council Offices, Bromley Cross, near Bolton, Lancs.

IRAN, March 9—Rail chairs. (ESB/3259/58.)

PORTUGUESE EAST AFRICA, March 10—Woodworking machinery. (ESB/3692/58.)

SOUTH AFRICA, February 26—Tin ingots (ESB/3887/58.)

Yorkshire Imperial Metals

Disposing of assets worth about £18,000,000. Yorkshire Imperial Metals, Limited, the new company which represents the fusion of the copper and alloy tube, fittings and plate activities of the Yorkshire Copper Works, Limited, and of Imperial Chemical Industries, Limited, has now been formed.

The assets include the former ICI plants at Kirkby (Liverpool), Smethwick (Staffs), Landore (Swansea), and Dundee, and the former Yorkshire Copper plants at Leeds, Barrhead (Glasgow), and Castleford (Yorks). The registered office of the new company is at Haigh Park Road, Leeds.

The board of directors has been constituted as follows:—

From ICI: Dr. James Taylor (chairman), Mr. Peter T. Menzies, Dr. Maurice Cook, Mr. Michael J. S. Clapham, Mr. St. John Elstub, Mr. Harold Royle, and Mr. Walter N. Ismay. From Yorkshire Copper: Mr. George P. Norton (deputy chairman), Mr. H. F. Sherbourne (managing director), Mr. W. R. D. Macdonald, Mr. C. G. Robinson, Mr. Donald Fraser, Mr. J. Christie, and Mr. Clifford Breckon. The company's secretary is Mr. P. D. Peel Yates.

News in Brief

THE 1,150 EMPLOYEES of Tangye's, Limited, Smethwick, celebrated the firm's centenary with a dinner/dance and cabaret at Oldbury on February 14.

THREE UNIVERSITY SCHOLARSHIPS are being offered each year by the Guest, Keen & Nettlefolds, Limited, group of companies to boys who might not otherwise be able to accept the offer of a place at a university.

EXPORTS of iron and steel manufactures from Grimsby in the four weeks to January 26, were sharply down compared with the same period a year ago. Shipments of coal during the period totalled 91,307 (95,318) tons.

THE INSTITUTION OF CHEMICAL ENGINEERS are holding a spring meeting at the Hoare Memorial Hall, Church House, London, S.W.1 on March 4. Details are available from the secretary of the Institution at 16, Belgrave Square, London, S.W.1.

THREE CEMENTATION FURNACES at the works of R. G. Holland & Company, Limited, of Lumley Street, Sheffield, are to be demolished. The furnaces, the oldest in the city, and believed to be the oldest in Britain, were last used 10 years ago.

AN APPLICATION by the Park Gate Iron & Steel Company, Limited, Rotherham, to develop 200 acres of land at Aldwarke for a new iron and steel works with provision for social recreation has been approved by the Ministry of Housing and Local Government.

ACCORDING to the Bureau of Statistics' final figures, Canadian steel-ingot production last year fell to 4,942,133 tons from 5,185,227 tons in 1956 and output of steel castings was 113,731 (120,578) tons. Pig-iron production increased from 3,568,196 to 3,718,155 tons.

BORAX & CHEMICALS, LIMITED, announce the appointment of Ralph Lawton, Limited, as their agents in the Potteries. From March 1, Lawton's will be operating from their new address at Rose Vale, Chesterton, Newcastle, Staffs: (Telephone: Newcastle 68073).

CLAY CROSS (IRON AND FOUNDRIES), LIMITED, Derbyshire, have secured a £140,000 contract for the supply of 2,750 tons of spun-iron pipes and castings in connection with a water-supply scheme in Celyon. Work on the contract and despatch will begin in March and will be completed in about three months.

THE NAME of the Self-Priming Pump & Engineering Company, Limited, Slough, has been changed to the SPE Company, Limited. The London office of the company, which is an associate of the Pulsometer Engineering Company, Limited, Reading, is now at 20/26, Lamb's Conduit Street, London, W.C.1.

PLANS HAVE BEEN APPROVED for a large extension to the works canteen at the North British Steel Foundry, Limited. The extension will comprise a new brick-built two-storey block, 63-ft. long by 29-ft. wide, providing on the ground floor a lounge-games room with extension to existing bar and cellar, and toilets.

RADIATION, LIMITED, have entered into an agreement entitling them to manufacture for the home market and certain overseas territories the range of warm-air appliances devised by the Eureka Williams Corporation of America. The agreement also provides for the mutual exchange of technical information about design and production methods.

D. NAPIER & SON, LIMITED, London, W.3, has received an order for 30 Napier Eland turbine propellor engines for installation in a new medium-range transport aircraft to be built by Canadair, Limited, Montreal, for the Royal Canadian Air Force. The order is worth about £1,430,000. The engines are already being made at the company's Netherton works, near Liverpool.

A NEW MODERN-STYLED PLANT at Beaumont, Texas, USA. is now producing "Hypalon" synthetic rubber at the rate of 6,700 tons per year. The new plant, which replaces limited facilities at Charleston, West Virginia, ensures that increased supplies of the material will be available through the United Kingdom distributors, Durham Raw Materials, Limited, 1-4, Great Tower Street, London, E.C.3.

A SILVER CANDLESTICK has been presented to Nuneaton Corporation by the Nuneaton foundry company, Sterling Metals, Limited, to be added to the collection of civic plate now being got together to mark the 50th anniversary of the granting of a charter of incorporation to the Borough. Mr. Edward Player (managing director) formally handed over the piece of plate to the Mayor (Councillor R. Wilkinson), on February 14.

A £50,000 THREE-STOREY BUILDING is to be built at the Walsall premises of the Talbot Stead Tube Company, Limited, one of the Tube Investment group, to house the laboratory and engineering departments. At present these departments are spread all over the 33-acre site, and centralization will make consultation between them easier. The building is expected to be completed by August. A 100-ton Avery tension machine for measuring metal fatigue is being installed.

PLANT WORTH £2,000,000 for a power station to be built in Buenos Aires, has been ordered from Worthington-Simpson, Limited, Newark (Notts), by the British Thomson-Houston Export Company, Limited. Condensing, free-heating, distilling, and de-aerating plants, together with boiler feed and circulating pumps are included in the order. The total capacity of the station will be 600 mw. The contract is the largest ever received by the Newark company, which will make its first shipments in November next year.

F. W. BERK & COMPANY, LIMITED, announce that they are removing at the end of February to their new head office building—Berk House, Portman Square, London, W.1 (telephone: HUNter 6688). Occupation will be completed by March 1. Berk's industrial dryer division, their powder metallurgy division and micronizer plant department will also transfer from their present separate offices to Berk House. The heavy chemicals sales department will remain at Abbey Mills Chemical Works, London, E.15, and the Schori division head office (metal and plastic coatings) at Brent Crescent, London, N.W.10.

TAYLOR'S BELL FOUNDRY at Loughborough was visited by a coachload of parishioners from Hucknall Parish Church, Nottinghamshire, on February 12, to see work started on the casting of a peal of eight bells for their church. The church has had three old bells for many years. Experts say that one was cast in the middle of the 14th century. A second was installed to celebrate the Restoration in 1660, and a third added a century later. Two are being melted down and recast to tone in with the new bells, but the medieval bell is being retained. The new bells are being given by a parishioner as a memorial.

Mr. W. A. MCADAM, Agent General for British Columbia, and Mr. H. Leslie Brown, Commercial Counsellor for Canada, were among the guests at the Birmingham works of British Thomson Houston Company, Limited, at Blackheath on February 11, to celebrate the production of the 2,000,000th electric motor since output began in 1921. Other civic and industrial guests saw the motor ceremoniously fitted with a special

News in Brief

maple leaf plaque and it was announced that it would be shipped to Canada and shown at the Vancouver International Fair which opens in May. The Mayor of Halesowen, Councillor P. W. Scott, gave the motor an official send off.

SPEAKING AT THE ANNUAL DINNER of the Armstrong Siddeley Motors Apprentices' Association in Coventry, on February 14, Mr. H. T. Chapman, managing director of the company, said that the firm intended to try to capture the light-engine field, which would mean the building of 1,000 h.p. engines for aircraft and helicopters. Great hopes were being placed on the production of the Viper engine for which there were encouraging possibilities in the American market. Another objective was to produce under licence the German 1,200 h.p. Maybach diesel engine to be used on British Railways. Mr. Chapman said he hoped by the end of the month to sign an agreement for the production of 9,600 h.p. industrial gas-turbine engines "to be used in oilfields throughout the world." Full employment in the company for at least three years was forecast by Mr. Chapman.

Improving Productivity

"Improving Productivity in Foundrywork," is the title of a lecture to be given by Dr. I. G. Slater, PH.D., M.SC., F.I.M., to a joint meeting of the Association of Bronze & Brass Founders and the Birmingham Productivity Association on February 25. It is to be held in the main hall of the Byng Kendrick Suite, the College of Technology, Gosta Green, Birmingham. Dr. Slater is head of the Department of Metallurgy at the College, and besides being the author of many scientific and technical publications, has spent a considerable time in the US and has also had the opportunity of studying foundry practice in Brazil and Russia. The meeting, which commences at 7 p.m., will be open for all foundrymen to attend and no tickets are required.

Board Changes

GREAT WESTERN ORES, LIMITED—Brig. H. G. Smith has been appointed a director.

B. ELLIOTT & COMPANY, LIMITED—Mr. L. E. Strange has been appointed a director.

SANDERSON BROS. & NEWBOULD, LIMITED—Mr. H. C. Reed has been elected to the board.

WHITEHEAD IRON & STEEL COMPANY, LIMITED—Mr. C. H. G. Millis has resigned from the board.

CRABTREE ELECTRICAL INDUSTRIES, LIMITED—Mr. J. A. Crabtree has been appointed chairman. He succeeds Dr. H. Schofield, who has resigned but remains on the board.

MECHANS, LIMITED—Mr. T. K. Bell has been appointed to the board as commercial director. The company is a subsidiary of Horseley Bridge & Thomas Piggott, Limited, Tipton (Staffs).

VICKERS-ARMSTRONGS (ENGINEERS), LIMITED—Mr. P. H. Muirhead has relinquished his appointment as managing director and has resigned from the board. He retains his other group directorships for the time being, but remains on sick leave. Mr. W. D. Opher has been appointed managing director.

Mr. K. E. SHENTON, managing director of James W. Shenton, Limited, engineers and ironfounders, of West Bromwich, has been appointed a Justice of the Peace.

Obituary

W. T. BELL

Mr. William Thomas Bell, O.B.E., J.P., M.I.MECH.E., who died on January 27 at the age of 90, was chairman and joint managing director of Robey & Company, Limited, Globe Works, Lincoln, and had been actively engaged with the company for 73 years up to the day of his death. He was apprenticed to Robey's in 1885, appointed secretary in 1893, director in 1905, managing director in 1914, and chairman and managing director in 1922. He successfully carried the company through the difficulties of the two world wars; in 1918 he was awarded the O.B.E.

Mr. Bell conceived and brought into being, in 1928, the original idea of the Robey Board of Co-operation, a committee whose members are elected by the workmen of each department to meet the management every month in a round-table conference, to discuss all matters helping to improve working conditions. This idea was put into operation many years before the introduction of joint consultative committees during the late war. His numerous activities included serving on the Lincoln City Magistrates' Bench from 1922 until he reached the age limit. He was also a past-president of the Lincoln Chamber of Commerce, and of the Rotary Club, a trustee of Lincoln Municipal Charities and of the Canwick Common Trust Fund, and was the patron of the Lincoln Engineering Society.

Mr. A. V. JARRATT, manager of the London office of British Polar Engines, Limited, Glasgow, died on February 8 at the age of 67.

Mr. CECIL H. THORNE, who was a chemist with the Coltness Iron Company, Limited, Wishaw, for 43 years before he retired in 1954, has died.

Mr. ARTHUR RODWAY, who for more than 30 years, until his retirement in 1955, was a representative for Borax & Chemicals, Limited, died on his 70th birthday, on February 13. For many years he was active in the Institute of Vitreous Enamellers.

The death has taken place at the age of 62 of Mr. A. C. BODDIS, who was secretary of the Iron and Steel Board from 1946 to 1949. Mr. Boddis had held many prominent positions in the Civil Service.

The death has occurred at the age of 81 of Mr. WILLIAM WALKER, a former secretary and director of George Denham & Company, Limited, heating and electrical engineers, and iron and brassfounders, of Darlington.

Mr. W. V. RILEY, son of the founder of the Riley Motor Company, Limited, now merged with the British Motor Corporation, Limited, and managing director of Riley (Coventry), Limited, until 1947, has died at the age of 84. He was a former director of Beans Industries, Limited, Tipton (Staffs).

Mr. SIDNEY ALFRED DAVIS, Midland Regional Controller of the Ministry of Supply from 1946 to 1953, died on February 11 at the age of 71. Mr. Davis was a director of Maudslay Motor Company, Limited, and adviser to the Birmingham Exchange and Engineering Centre and latterly he had been associated with W. S. Atkins & Partners, civil engineering consultants.

IT IS REGRETTED that in the announcement in the February 6 issue of the JOURNAL about the acquisition of the Fletcher Miller group by C. C. Wakefield & Company, Limited, the name of one of the new directors of Fletcher Miller, Limited, was wrongly spelled as Mr. Wendridge, when it should have been Mr. Windridge.

Company News

NOBLE & LUND, LIMITED, machine-tool manufacturers, of Gateshead—Net profit is £65,980 (£64,553), after taxation of £67,449 (£69,175). The dividend is being raised to 20 (18½) per cent. for 1957 with a final of 14 (12½) per cent.

PETO SCOTT ELECTRICAL INSTRUMENTS, LIMITED—The accounting period, which hitherto has been to June 30, will now be to December 31. Accounts will be prepared for the period to December 31 this year and to December 31 of each year in future.

HARLAND ENGINEERING (AUSTRALIA), LIMITED—Expansion of activities involving the expenditure of about £A100,000 over the next two years is under discussion, according to Mr. R. W. Weeks, managing director of the Harland Engineering Company, Limited.

INTERNATIONAL COMBUSTION (HOLDINGS), LIMITED—The final dividend is being raised by 2½ per cent. to 17½ per cent., making 25 (22½) per cent. for the year to September 30, 1957. Group profits, before tax, increased by over £700,000 to £2,801,201, and the balance, after tax, is up from £913,414 to £1,274,745.

METAL INDUSTRIES, LIMITED—The interim dividend is being raised to 4 (3) per cent. on the £3,900,000 ordinary for the year ending March 31. The final for 1956-57 was 6 per cent., making 9 per cent. for the year. In addition a special bonus of 5 per cent. was paid in recognition of the significant recovery in the group's fortunes. Profits, before tax, for the first 24 weeks of the current year amounted to £719,000 (£543,000).

W. H. DORMAN & COMPANY, LIMITED, diesel engine manufacturers, of Stafford—In view of difficult trading conditions and lower profits earned in the first half of the year ending March 31 next, the directors have decided not to make any decision regarding payment of dividend until accounts for the full year are available. They do not propose, therefore, to pay an interim. For 1956-57 an interim of 4½ per cent. was followed by a final of 8½ per cent.

BABCOCK & WILCOX, LIMITED—Applications amounting to over £43,000,000 were received for the £2,000,000 6 per cent. debenture stock, 1980-83, despite the fact that the offer was only open to members and debenture holders. For applications up to £100, allotment has been made in full; £200-£2,500, £100 each, and over £2,500, about 4 per cent. It is also announced that acceptances have been received for about 95½ per cent. of the 1,881,099 £1 ordinary shares which were offered to stockholders by way of rights at par.

POWER-GAS CORPORATION, LIMITED—Group trading profit and other income rose by nearly £200,000 to £1,052,562, and the net taxed balance is up from £299,321 to £358,695. The net profit attributable to the company, after outside interests, is £356,279 (£296,699). A final dividend of 10 per cent. is announced. This makes 15 per cent. for the year to September 30, 1957, on £1,400,000 capital, an increase of 1 per cent. over the previous year's single 14 per cent. payment on £1,000,000, prior to a rights issue.

GEORGE COHEN 600 GROUP, LIMITED—Last September, Mr. C. M. Cohen, chairman, stated that the disparity between the interim and final had become a little too wide and that a 4½ per cent. interim would be declared if the directors were satisfied that profits for the current year would justify the same total dividend. The proposed increase, it was then stated, must not be taken as signalling a higher year's total. The 1956-57 final was 8½ per cent. on the present capital. The company is accordingly paying an interim dividend of 4½ per cent. on the £3,125,000 ordinary in respect of the year ending March 31 next, against 3½ per cent. on £2,500,000. The half-yearly dividend on the £1,500,000 4½ per cent. cumulative preference stock will be 4½ per cent., and on the £1,000,000 second cumulative preference stock will be 6½ per cent.

J. SAMUEL WHITE & COMPANY, LIMITED, shipbuilders and marine engineers, etc., of Cowes, Isle of Wight—The chairman, Mr. J. A. Milne, warns members that there is evidence to suggest that the seller's market in shipbuilding may be disappearing, particularly for such companies as their own where shipbuilding berths do not permit the construction of very large vessels, particularly tankers. The volume of shipbuilding and engineering work in hand will keep the present labour force employed for most of the next three years, but prospects for next year are not bright for the boat-building department. The value of work in hand has risen to £1,195,793 (£871,073). The Island Transport Company, Limited, was fully and gainfully employed, but the other three subsidiaries operated at a loss. Group net profits were lower at £111,013 in 1956-57, against £153,656, and the dividend is effectively reduced by 2½ per cent. to 20 per cent.

Forthcoming Events

FEBRUARY 25

Institution of Works Managers

Lancaster group:—"Trade Effluents—National and Local Problems," by D. Mercer, 7.30 p.m., at the Royal King's Arms Hotel.

Incorporated Plant Engineers

South Wales branch:—"Instrumentation," by J. M. Keating, 7.15 p.m., at the South Wales Engineers' Institute, Park Place, Cardiff.

FEBRUARY 26

Institute of British Foundrymen

Birmingham branch:—"Application of Automatic Controls to Mould Production in Fully- and Semi-mechanized Foundries," by J. A. Hufton, 7.15 p.m., at the James Watt Memorial Institute, Great Charles Street.

London branch:—Discussion on test-bars, initiated by D. Morris, 7.30 p.m., at the Constitutional Club, Northumberland Avenue, W.C.2.

Society of Chemical Industry

Corrosion group:—"Stress Corrosion Cracking of Stainless Steels" by T. P. Hoar and J. G. Hines, and "Stress Corrosion Cracking of Carbon and Low-alloy Steels," by R. N. Parkins, 2.30 and 5.30 p.m., at Stephenson Building, King's College, Newcastle-upon-Tyne. (Joint meeting with Newcastle section.)

Institution of Production Engineers

Shrewsbury section:—"Shell Moulding," by G. Hannaford and T. Lawrence, 7.30 p.m., at the Walker Technical College, Oakengates.

FEBRUARY 27

Southampton Metallurgical Society

"Non-destructive Testing of Metals," by Dr. Hanstock, Ph.D., 7.15 p.m., at the Southampton University.

Incorporated Plant Engineers

Sheffield and district branch:—"Atmospheric Pollution in Industry," by W. Herring, 7.30 p.m., at the Grand Hotel, Sheffield.

FEBRUARY 28

Institute of British Foundrymen

Beds/Herts section:—"Men Only" dinner, reception 7 for 7.30 p.m., at the Wilbury Hotel, Letchworth.

Falkirk section:—"Coreprints," by J. G. Arnott, 7.30 p.m., at the Temperance Café, Lint Riggs.

Tees-side branch:—"Precision Castings," by R. G. Nicholas, at the Darlington Technical College.

SHORT BROS., LIMITED, Sunderland, has received an order from an Oslo company to built a 13,900-ton motor ship. The vessel, a cargo carrier, is due for delivery in 1962. The order is worth £1,000,000.

Personal

Sir JOHN DEAN has resigned from the board of Johnson & Phillips, Limited.

Mr. H. C. SARGENT has resigned from the board of Bilston Foundries, Limited, owing to ill-health.

Mr. G. C. FAIRBANKS, a deputy general manager of Elliott Brothers (London), Limited, has been appointed a director.

Mr. S. C. TYRRELL has been appointed a director of Ransomes & Rapier, Limited. Mr. R. B. LAMB has resigned from the board.

BTR Industries, Limited, announce that Mr. P. W. HOWARD, the managing director of the company, has also been appointed deputy chairman of the board.

Mr. A. C. YEATES has been appointed chairman of Crossley-Premier Engines, Limited, a subsidiary of Crossley Brothers, in place of the late Sir KENNETH CROSSLEY.

Mr. W. H. FLETCHER, aged 81, a skilled brass finisher, has retired after 67 years' service with W. N. Baines & Company, Limited, Phoenix Brass Works, Rotherham.

Mr. J. S. CADMAN has been appointed chairman of Cowlishaw Walker & Company, Limited, in succession to the late Capt. G. W. DOBSON. Mr. Cadman is also managing director.

Mr. T. A. A. BARKER, a director of J. & J. Horsfield, Limited, Vulcan Ironworks, Dewsbury, recently completed 60 years' association with the firm, with which he began work as office boy.

Councillor THOMAS ROCHELLE, a moulder in the foundry of Newby & Sons, Limited, ironfounders, West Bromwich, has accepted nomination for election as the next Mayor of West Bromwich.

Mr. N. G. P. BOSWOOD, secretary of the George Cohen 600 Group, Limited, has been appointed a director of the Colchester Lathe Company, Limited, a member company of the 600 Group.

Mr. H. WESTON HOWARD has resigned from the board of Engineering Components, Limited in order to devote more time to the interests of Hayward Tyler & Company, Limited, of which he is managing director.

Mr. H. GREENFIELD, who has been appointed works manager of Hattersley Brothers, Limited, Queens Foundry, Mexborough, Yorks, has been with the company for 29 years. He was previously assistant works manager.

Mr. K. ASPLAND has relinquished his position as secretary of the Standard Motor Company, Limited, to enable him to broaden his activities as a director of the company. He has been succeeded by the assistant secretary, Mr. J. CONSTANTINE.

Mr. ROBERT VALLANCE, who was the oldest workman at Cochran's Engineering Works, Newbie, has retired after 40 years' service with the firm. He was presented with a cheque from the directors, while his fellow-workers gave him an electric shaver.

Mr. C. V. MCNEILL sales director of the Phosphor Bronze Company, Limited, Birmingham, was presented with a television set by Mr. G. T. HYSLOP, chairman of the company, at a ceremony on February 14 to mark his retirement after 40 years' service with the firm.

The first woman to complete 50 years' service with Babcock & Wilcox, Limited, Renfrew, is Miss HELEN RALSTON, who joined the company in October 1907, and retired last week. Mr. C. H. Davy, resident director, presented her with a dining set and a wallet of notes.

Mr. HENRY GARDNER, managing director of Glenfield & Kennedy, Limited, hydraulic engineers, Kilmarnock, will retire on June 30. He is to be succeeded by Mr. ALEXANDER ROBERTSON, a director of the firm and managing director of Alley & MacLellan, Limited, Worcester.

Mr. R. G. S. LUDLAM, assistant registrar at the University of Leeds since 1951, has been appointed registrar-secretary of the Institution of Metallurgists in succession to Dr. A. D. MERRIMAN, who recently retired from the post to become scientific consultant to Edgar Allen & Company, Limited, steelmakers, Sheffield.

George Kent, Limited, Luton, announce the following appointments:—Mr. L. A. C. BARTLETT has undertaken the over-all supervision of the steering-gear division; Mr. R. S. MEDLOCK has been appointed as technical and home sales director; Mr. E. E. COOK is to direct the central organization; and Mr. J. THAM is to be home sales manager.

Mr. K. A. M. BARTON, sales director, and Dr. R. A. GREGORY, production director, have been appointed joint managing directors of Midland Silicones, Limited. Mr. S. BARRATT, the former managing director, who was recently appointed chairman of the parent company, Albright & Wilson, Limited, remains on the board of Midland Silicones as a non-executive director.

At the fourth annual dinner of Arthur Green, Limited, ironfounders and manufacturers of machine-tool castings, Chesterfield, a gold watch was presented to the company's managing director, Mr. HUGH SANDS, to mark the completion of 25 years' service. Mr. Sands worked in Canada for the Massey-Harris concern after the 1914-18 war and came back to this country in 1933 and joined Arthur Green, Limited.

Councillor EDGAR HILEY is to be the next Mayor of Solihull, Warwickshire. He was appointed secretary of the Birmingham Brassfounders' Employers' Association in 1941 and shortly afterwards became secretary of the National Brassfoundry Association. He is an Alderman of Warwickshire County Council and a member of Solihull Borough Council. He was unanimously selected for the next mayoralty at a meeting of the Town Council and will take office in May.

Dr. BRIAN BALDWIN has been appointed assistant chief metallurgist of the steel division of the Steel Company of Wales, Limited. Dr. Baldwin, who joined the company in July of last year as research metallurgist, blast furnaces had previously been engaged on research into iron making at the London laboratories of the British Iron and Steel Research Association. He was educated at Brighton Technical College, and the Imperial College of Science and Technology, London, where he obtained his B.SC. and PH.D. degrees.

Messenger & Company, Limited, ironfounders and engineers of Loughborough, are to celebrate their centenary this year and for the first time in their history the firm has no Mr. Kerfoot as foundry foreman. This is because Mr. JOSEPH KERFOOT has just retired at the age of 77 after many years as foundry foreman, out of a total of 63 years spent with the firm. His father, the late Mr. JAMES KERFOOT, was Messenger's first foundry foreman; his brother, the late Mr. JOHN KERFOOT, was the second, and then followed Mr. Joseph.

Raw Material Markets

Iron and Steel

Foundries need much more work than is at present being received to keep their plants working to capacity. For some time the light foundries have been only moderately employed and the near future holds out little hope of any appreciable improvement. Those foundries supplying castings to the domestic equipment trade continue to find business very quiet, credit restrictions being the main drawback to busier conditions. Similarly the cuts in the building programme and other restrictions are keeping down demands for castings. A number of the light foundries, mechanically equipped to produce much larger outputs than they have been able to obtain for some time, are not in full operation.

The textile foundries are also only moderately employed and trade at the jobbing foundries fluctuates. Because of the scarcity of work and the uncertainty of the future, demands for high-phosphorus pig-iron are quiet, and producers generally are unable to dispose of their makes of iron. Export merchants, against strong competition, have been able to relieve the pressure of growing stocks by the business they have obtained from overseas customers, and appreciable tonnages have been shipped abroad.

The home market, however, shows little prospect of improvement. Orders now being placed cover supplies for immediate consumption requirements only, and there is very little forward buying, apart from the quantities required to provide a working stock. This is kept at minimum levels, as deliveries of any extra supplies can be obtained promptly.

The engineering and speciality foundries are able to obtain much better results, and good orders continue to be received for high-duty castings for many trades. Those connected with the motor vehicle trade are well employed and, so far, demands for castings are maintained at recent levels. These foundries are absorbing the outputs of the low-phosphorus irons and fairly good tonnages of hematite, and some supplies of refined irons are also used by them, although they prefer the low-phosphorus grades on account of the advantage in price.

Most of the foundries have adequate supplies of scrap, including heavy cast-iron and machinery scrap, which is mainly called for. Light and medium grades are plentiful. Foundry coke is coming to hand in satisfactory quantities, while ganister, limestone, and firebricks are available to requirements.

The supply of steel semis from home steelworks is on a good scale and, in the normal analyses and sizes, larger tonnages are available than are called for. In carbons and alloy steels outputs are not so plentiful. The stocks of billets on and at the re-rollers are not being used up so rapidly as expected, due to the continued decline in the demand for small bars and light sections. This is resulting in short-time working at some units, difficulty being experienced in making up rolling programmes owing to the scarcity of orders. The larger sizes are in better demand, and the re-rollers engaged in the production of reinforcing rods have good order-books.

There is little call for defectives and crops and arisings at the steelworks are being placed into stock.

Non-ferrous Metals

The reduction in the US custom smelters' price by ½ cent to 23½ cents a pound last week brings into play the possibility of the reimposition of a US import duty of 2 cents per pound. This would become a fact if the average price for the month falls below 24 cents a pound, so that all eyes are on the producers' price, which still stands at 25 cents a pound. The US producers are reluctant to reduce their quotation because of their foreign-owned and operated companies, on which the duty would be felt most severely and would no doubt lead to further cutbacks in production. Nevertheless, the possibility is there and should the 2-cent duty be brought into force by the President it would remain effective thereafter regardless of prices. At present the producers' price is too high to compete with imported copper. Copper for export in the US is on offer at 22½ cents and scrap is selling at 17½ cents.

In London the US custom smelter price reduction and lowering of the Belgian price by two successive cuts last week made for a weak market and copper was traded down to £160 a ton, equivalent to 20 cents a pound, before recovering to a level slightly above this figure. The undertone of the London market is still weak and the most recent batch of copper production statistics has done little to strengthen it. Indeed, the Rhodesian Selection Trust figures show that the lower output from Roan and Mufulira have been more than offset by the expanded production from Chibuluma, while figures for the Belgian Congo show that output in 1957 was only about 7,000 tons less than in 1956.

In the London tin market the feature is, perhaps, the lessening pressure on the buffer stock manager to support the market. Some support has been necessary, however, as the increase in stocks last week by 964 tons to 16,454 tons shows. The real point is that the Malayan Government has given assurances that it is prepared to back the International Tin Council in its restriction scheme, as is the All-Malaya Chinese Miners' Association, whose President said last week that his association was opposed to any move to lower the present floor price of tin. These assurances will take some time to percolate down through to consumers in the same way that the impact of the restriction scheme will not make itself felt until around April. The latter estimate of the time-lag results from a reassessment of the tonnages of tin available in the pipelines which had been underestimated. But with the amount of metal coming available to be absorbed by the buffer stock manager decreasing steadily, signs of a price squeeze in the metal cannot be far away. The Wah Chang Corporation has confirmed that it has arranged to buy Indonesian concentrates for smelting at its Texas smelter. Wah Chang recently purchased the smelter from the US Government and it is the only tin smelter in the United States and the only one with any substantial capacity in the Western hemisphere. In the US the price is still hovering around 93 cents a pound, with interest centred around nearby positions.

On Tuesday, the price of prompt tin moved up by 30s. per ton in the morning trading session to £731 10s., after having held at the £730 level for nearly three weeks. On the following day the price moved up to £736. Deliveries of tin on the London Metal Exchange have been temporarily suspended, and this was one of the factors contributing to the rise in the price.

Lead is only modestly active on both sides of the Atlantic. In the US the price remains at 13 cents a pound. The chief item of news has been that the Australian producers—Zinc Corporation and New Broken Hill—have cut back production by one day a fortnight. News of the Australian producers' decision to cut back production had little effect on the zinc price in London. The market remains dull both here and in New York, where the quotation is still called 10 cents a pound.

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

February 19, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2:—Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.—North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.:—N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £48 10s. 0d. to £50 15s. 0d., scale 17s. 0d. to 17s. 6d. per unit; 75 per cent. Si, £68 10s. 0d. to £76 7s. 6d., scale 17s. 0d. to 17s. 6d. per unit.

Ferro-vanadium.—50/60 per cent., 26s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £299 0s. 0d.

Ferro-tungsten.—80/85 per cent., 8s. 8d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 11s. 8d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £93 0s. 0d. to £96 10s. 0d., basis 60 per cent. Cr, scale 32s. 0d. per unit; over 6 per cent. C, £91 0s. 0d., basis 60 per cent. Cr, scale 31s. 0d. to 32s. 0d. per unit; 2 per cent. C,* 2s. 2d. per lb. Cr; 1 per cent. C,* 2s. 2½d. per lb. Cr; 0.15 per cent. C,* 2s. 3½d. per lb. Cr; 0.10 per cent. C,* 2s. 3¾d. per lb. Cr; 0.06 per cent. C,* 2s. 4d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 7s. 3d. to 7s. 10¼d. per lb.

Metallic Manganese.—90/92 per cent., carbon-free, £290 0s. 0d.; 96/98 per cent., £310 0s. 0d.

Ferro-columbium.—65/75 per cent., Nb + Ta, 20s. 9d. to 21s. 3d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £87 19s. 3d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft, u.t., £33 1s. 6d.; tested, 0.08 to 0.33 per cent. C, £34 1s. 6d.; hard (0.41 to 0.60 per cent. C), £35 3s. 0d.; silico-manganese, £44 2s. 6d.; free-cutting, £37 5s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 7s. 0d.; silico-manganese, £44 10s. 0d.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 16s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 18s. 6d.; acid, up to 0.25 per cent. C, £43 10s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 12s. 0d.; boiler plates (N.-E. Coast), £45 2s. 0d.; floor plates (N.-E. Coast), £44 1s. 0d.; angles (N.-E. Coast), £40 6s. 6d.; joists (N.-E. Coast), £40 2s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats, 5 in. wide and under, untested soft basic, 50 tons and over, £40 8s. 0d. (under 10 tons to 4 tons, £41 5s. 6d.; under 4 tons to 2 tons, £41 10s. 6d.); hoop and strip, coils, £40 10s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £45 16s. 0d.; black sheets (hand mill), 24g., £59 4s. 6d.; galvanized corrugated sheets, 24g., £67 6s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £69 9s. 6d.; nickel-chrome, £100 12s. 6d.; nickel-chrome-molybdenum, £112 16s. 6d.

NON-FERROUS METALS

Copper.—Cash, £163 10s. 0d. to £163 15s. 0d.; three months, £164 5s. 0d. to £164 10s. 0d.; settlement, £163 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 1s. 7d. per lb. rods, 184s. 9d. per cwt. basis; 20 s.w.g., 218s. 0d. per cwt.

Tin.—Cash, £736 0s. 0d. to £737 0s. 0d.; three months, £738 0s. 0d. to £739 0s. 0d.; settlement, £737 0s. 0d.

Lead (Refined Pig).—Second half February, £76 0s. 0d. to £76 5s. 0d.; second half May, £75 10s. 0d. to £75 15s. 0d.

Zinc.—Second half February, £64 2s. 6d. to £64 7s. 6d.; second half May, £63 17s. 6d. to £64 0s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £98 5s. 0d.; rolled zinc (boiler plates), all English destinations, £96 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £87 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 4½d. per lb.; sheets to 10 w.g., 146s. 0d. per cwt.; wire, 2s. 1⅝d.; rolled metal, 146s. 0d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £125; B6 (85/15), —; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £168; HTB2 (38 tons), —; HTB3 (48 tons), — .

Gunmetal.—BS1400, LG2 (85/5/5/5), £152; LG3 (86/7/5/2), £162; G1 (88/10/2/½), £218; (88/10/2/1), — .

Phosphor Bronze.—BS1400, PB1 (AID released), £235 per ton.

Phosphor Bronze Strip, etc.—Strip, 213s. 6d. per cwt.; wire, 3s. 4½d. per lb.; rods, 2s. 8d.; tubes, 2s. 8d.; chill cast bars: solids 2s. 10½d.; cored 2s. 11½d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 3¾d. per lb.; round wire, 10g. in coils (10 per cent.), 3s. 8½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 7½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £74 0s. 0d. to £75 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £197 0s. 0d.; aluminium bronze (BS1400), AB1, £199; AB2, — .

* Average 68-70 per cent.